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TWENTY-EIGHTH ANNUAL REPORT

OF THE

State Department of Health

OF

NEW YORK

FOR THE YEAR ENDING DECEMBER 31, 1907

VOLUME I

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TWENTY-EIGHTH ANNUAL REPORT

OF THE

STATE DEPARTMENT OF HEALTH

STATE OF NEW YORK,

EXECUTIVE CHAMBER,

ALBANY, *February* 4, 1908.

To the Legislature:

I have the honor to transmit herewith the twenty-eighth annual report of the State Department of Health.

(*Signed*) CHARLES E. HUGHES

26792

NEW YORK STATE DEPARTMENT OF HEALTH

Division of Administration

Commissioner
EUGENE H. PORTER, M.A., M.D.

Secretary and Deputy Commissioner
ALEC H. SEYMOUR

Division of Sanitary Engineering

Chief Engineer ..... THEODORE HORTON, C.E.
Principal Assistant Engineer ..... H. B. CLEVELAND, C.E.
Special Assistant Engineer ..... Prof. H. N. OGDEN, C.E.
Assistant Sanitary Engineer ..... H. W. TAYLOR, C.E.
Inspecting Engineer ..... C. F. BREITZKE, C.E.

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Bender Laboratory — Director ..... R. M. PEARCE, M.D.
Cancer Laboratory — Director ..... H. R. GAYLORD, M.D.
Chief Sanitary Chemist ..... L. M. WACHTER
Assistant Bacteriologist ..... M. C. CUNNINGHAM
Assistant Chemist ..... A. J. SLACK

Division of Vital Statistics

Director ..... F. D. BEAGLE

Division of Communicable Diseases

Director ..... J. T. WHEELER, M.D.

Division of Publicity and Education

Director . . . . . HILLS COLE, M.D.

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Dermatologist . . . . . FREDERIC C. CURTIS, M.D.
Orthopedist . . . . . HARLAN P. COLE, M.D.

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JOHN L. HEFFRON, M.D. . . . . Syracuse

REPORT

To Hon. CHARLES EVANS HUGHES, *Governor of the State of New York, Albany, N. Y.:*

Sir:— I have the honor to transmit herewith the twenty-eighth annual report of the State Department of Health for the year 1907.

The responsibilities and consequent activities of the Department during the past year centered in its various Divisions, have assumed such definiteness of form and such accomplishment of results that the work of the Department may be found described in detail under the divisional titles and will be but briefly noted elsewhere.

Among the things specially mentioned in the last report as matters to be taken up were: Pollution of Streams; Investigation of Watersheds; Sanitary Investigation of Cities; Investigation of Summer Resorts; Investigation of all Sewage Disposal Plants; Investigations of all Public Water Supplies; Meat Investigations; Examinations of Eyes and Ears of School Children; Sanitary Institutes; Sanitary Conferences; Sanitation of State Institutions; Investigations of Ice Supplies, and Special Investigations of various kinds. All of these and many other matters referred to the appropriate division have been taken up, many of them completed, and on the remainder the work is actively progressing.

In the Administrative Division it may be proper to state that the number of pieces of first-class mail received by the Department during 1907 showed an increase over 1906 of 12,726 pieces; that all mail received showed an increase of 34,258 pieces; that the number of pieces of first-class mail sent out showed an increase of 18,955 pieces; and the increase in all mail and packages sent out was 40,128 pieces.

THE FUNCTION OF A STATE HEALTH DEPARTMENT

"In health there is liberty," said Amiel many years ago. Health is the first of all liberties and happiness gives us the energy which is the basis of health. Emerson said in his Conduct of Life, "The first wealth is health." We are all agreed that the greatest blessing is health and when that is gone, all is gone.

How far then, shall the State go in its endeavor to protect and extend the public health? The fact that this question is being asked repeatedly with increasing force is significant to the students of social progress.

The old days and the old conceptions of disease and health are passing away. The beliefs, selfish and ignorant, that human beings could be crowded into humble houses destitute of light and air, reeking with filth and swarming with vermin, to die like vermin; that men and women must work more hours each than flesh and blood could bear; that children should be dwarfed and maimed by cruel labor; that the distressed and destitute must protect themselves against not only want but against the fatal diseases caused by man's ignorance, greed and inhumanity; these beliefs are passing away. The old way has cost more lives than all the wars since Alexander and more gold than has ever been mined. Slowly the lesson has been heeded. We have been led to more general concepts and away from the limitations of earlier prejudices and antagonisms.

In new situations vigor and enthusiasm construct a higher ethics, the practice of which elevates the plane of living. Now this drift of scientific, and to a very appreciable degree, also popular opinion, can mean but one thing. It means that sanitary science has in its process of development become a practical science and that it is now recognized as such. We have learned that if we allow our neighbor to die of plague we are likely to take passage with him across the river; that if we allow tenements of death we are exposed in turn to the Great White Plague, and that if we allow our neighbor to wallow in filth we must expect to suffer some of the consequences. We have learned, too, that we improve society when we improve its individual members. Every expansion of human intelligence has proved of advantage to society and all the great advantages in the social condition have turned to the profit of humanity.

Knowing these things it may be asked again, what is the duty of the State — of its Health Department?

It is to prevent disease by causing the individual to do all the things he can do, and then doing for him all the things he is unable to do. A real protection of the public health may only be attained by means beyond the reach of individuals. These things belong properly to the budget of the State and should not be added to that of the family. This policy should be pursued in sanitation as it is in the extension of education.

The citizens of the State have as much right to demand protection in health as safety from bodily violence and robbery. We all know the quick public change from an indifference regarding public health to one of frenzied apprehension in the face of an impending calamity. A little further progress and such crises would be avoided. And so, if, as Dr. Patten has said, the foundations of our very civilization have been somewhat changed, the old thought will gradually disappear — not because it is argued away but because men's sentiments and opinions are changed by new activity and an accumulating store of fresh experiences.

On broad lines to cause the citizen to do the things he can and ought to do and then to do for him the things that he cannot do, but should be done, is the duty of the State, and that being interpreted means the real prevention of disease.

And I need not speak of the remarkable advance of sanitary science during the past few decades — its victories over yellow fever, cholera, typhus fever, and plague, save to emphasize the fact that with all this advancement there have come to us new duties and increased responsibilities.

One of the greatest of modern biologists has recently said: "As we march onward toward the true goal of existence, mankind will lose much of its liberty but in return will gain a high measure of solidarity. The more exact and precise a science becomes the less freedom we have to neglect its lessons." These new duties are before us and it is only by organized, enlightened and persistent effort that we may hope to accomplish our ends.

TUBERCULOSIS

As knowledge increases and the beneficial results of modern sanitary methods are more and more intelligently appreciated, a

more active interest will be taken by the people in public health problems.

And, indeed, this is precisely what is happening at present in this State, in regard to tuberculosis. The prevalence of tuberculosis is universal; no other disease is so widespread or produces so much poverty and wide spread distress. Mortality tables do not reveal a tithe of the number actually infected, yet even such figures as are obtainable from death and census returns show an appalling annual sacrifice. From one-seventh to one-tenth of all deaths and an enormous proportion of invalidism are due to it. Kayserling stated at the recent Tuberculosis Congress at Paris (1905), that one-third of all deaths and one-half the sickness among adults in Germany may be charged to tuberculosis. It is stated in Osler's *Modern Medicine* that 11.3 per cent. of all deaths in England and Wales are still due to it. The last United States census (1900) gives a total of 111,059 deaths from consumption for that year, about one-ninth of the deaths from all known causes.

In New York State there are not less than 50,000 cases of tuberculosis, with 15,000 deaths annually. And it is a preventable disease.

The economic loss from tuberculosis is enormous even with a low estimate. It is safe to say that tuberculosis costs the State of New York $70,000,000 annually.

Thanks to the studies of Koch we know the cause of tuberculosis — the tubercle bacillus. Under ordinary conditions of city life at least, it is probable that the bacillus gains entrance from time to time into the body of almost every individual. It finds its way into the body through the mouth or nose by respiration, through infected food, or through wounds in the skin. The bacilli are spread about by patients coughing and talking and by expectoration. The chief method of distribution of the tubercle bacilli is undoubtedly promiscuous spitting. Tuberculosis is a preventable disease. Its continued sinister existence is due in greatest measure to the ignorance of the public as to proper and effective means of prevention and the indifference of a very large part of the medical profession. Enough is known by sanitarians and those rendered expert in the disease by special study; what is needed is the prompt and vigorous dissemination of their knowledge.

Education is the watchword in this campaign. Education of he people of the profession and last, but not by any means least, f the health officers. It is not a campaign of days — it will be . battle of years. For, while we may know that this is a prevent- ble disease it is not now prevented to any appreciable extent, nor vill it be prevented until a systematic, intelligent and persistent ffort is made. And the time to make this advance is now. It will not do to procrastinate, to palter, to urge a false economy. New York State should play well her part in the fight against this stealthy and merciless scourge.

It is not a simple problem; it is a most serious and weighty one. So serious does it seem and so immediate and pressing had the matter become, that it was deemed advisable to obtain the aid and advice of men eminent and experienced in this field of work. It is with great pleasure that I am able to anounce that the following distinguished gentlemen have consented to act as an Advisory Board to the Department and give such aid in dealing with this difficult question as may be possible.

Edward R. Baldwin, M.D., Saranac Lake.

Thomas Darlington, M.D., Commissioner of Health of the City of New York.

Livingston Farrand, Esq., Secretary of the National Society for the Prevention of Tuberculosis.

Homer Folks, Esq., New York City, Secretary of State Charities Aid Association.

George W. Goler, M.D., Health Officer of Rochester.

Willis G. MacDonald, M.D., Albany, member of the Board of Managers of Raybrook Sanitarium.

Alfred Meyer, M.D., New York City, Chairman of the State Committee of arrangements for the International Tuberculosis Congress.

Veranus A. Moore, M.D., Ithaca, Dean of the Veterinary College of Cornell University.

John H. Pryor, M.D., Buffalo, one of the Managers of Raybrook Sanitarium.

*W. H. Watson, M.D., Utica, ex-Regent of the University of the State of New York.

* John L. Heffron, M.D., of Syracuse, was later appointed a member.

The work directly ahead of the Department, after consultation with its Advisory Board, may be summarized as follows:

1. The Full and Proper Completion of the State's Tuberculosis Exhibit:

The one constructed last year, because of lack of funds, was sadly inadequate, but so great was the demand for it that it has been constantly on exhibition and will have to be virtually reconstructed. The State should have at least three of these exhibits and should have them without delay.

2. The International Congress:

In September of this year an International Congress on Tuberculosis will assemble at Washington, D. C. It will undoubtedly be the greatest and most representative gathering ever assembled in this country to consider matters affecting public health.

It is imperative that the Empire State be properly represented there by such a complete and comprehensive exhibit as shall conclusively demonstrate her living, active and leading interest in this work.

But it will be impossible for the Health Department in pursuance of the instructions of Governor Hughes, to gather together the contributions of all the municipalities, of all institutions, and of all allied departments of the State government and co-ordinate them into one harmonious whole unless adequate funds are supplied.

3. Registration and Notification:

There are several things the State might or could do, but there is one thing it must do — insist upon the registration of all cases of tuberculosis. It is absolutely essential that the location and distribution of these cases be known that proper means may be taken for instruction and relief.

You cannot give aid to any consumptive until you know where he is, nor can it be known what help he requires until the case is properly reported and the conditions described.

Convinced of the importance of this measure, it was announced at the Annual Conference of Health Officers at Syracuse, N. Y., October, 1906, that it was the fixed intention of the Department to request every health officer to make definite and specific regular

report of all cases of tuberculosis occurring within his jurisdiction beginning January 1, 1907. This was as far as the Department had authority to go and the results were necessarily very incomplete.

It is recommended in another part of this report that the Department be given necessary authority in this matter.

4. District Investigation:

It will be of little use, however, to insist upon the proper registration of all cases of tuberculosis unless there follows promptly a systematic and persistent supervision of the fight against the disease. This work should be carefully planned and conducted on broad and practical lines.

The Department should investigate the conditions existing in any given part or parts of the State; should ascertain if the various towns and localities in the State are each playing well their separate parts, and if not, how they can best be aided and urged forward in the work; should instruct health officers and health boards as to their specific duties; should provide for the establishment of local laboratories for bacteriological work in conjunction with the local authorities whenever advisable and possible; should provide for the wide distribution of circulars, pamphlets and other special and general literature bearing on the dissemination and prevention of the disease; should, through its experts enlist the press, the clergy, the school teachers, the farmers' institutes, the granges and every civic or local organization and furnish all these literature and competent speakers; and it must do these things constantly and without ceasing. For all this must be done carefully, intelligently, accurately, patiently, thoroughly, over and over again if we would hope to succeed.

There is also a plain duty now devolving upon the cities and towns of this State. They must take up, each for itself, the suppression of tuberculosis within their city lines. Not only should suitable local ordinances be enacted, and active supervision established, but the building of proper hospitals for tuberculosis ought to receive immediate attention. Already some of our cities, notably New York, which has proceeded on a large scale, Rochester, Syracuse and Buffalo have made beginnings. But outside of these few instances, but little has been done.

What can be done at hospitals for incipient cases has been demonstrated at Raybrook, where out of a total of 267 cases, 219 apparently recovered and 37 were arrested, and only one died. Even among those moderately advanced, 145 in all, 32 apparently recovered, 89 were arrested. If Raybrook could get cases when it should get them, in the real incipiency of the disease, its record of cures would be even more startling. It is now full and has a small waiting list, but many of its patients are still too advanced to give the best results.

At a recent meeting, the Advisory Board on Tuberculosis adopted the following resolutions:

1. *Resolved,* That a bill be presented to the Legislature providing for the notification and registration of all cases of tuberculosis.

2. *Resolved,* That the Advisory Board strongly indorses the educational value of the State tuberculosis exhibition which is now being shown around the State and believes that it should be duplicated.

3. *Resolved,* That the Legislature should be asked to place at the disposal of the State Department of Health adequate funds for the investigation of tuberculosis and for the taking of such measures as it may deem necessary for its supression.

In your message to the Legislature in January, 1908, you said, under the head of Public Health:

"The waste of life and productive energy which results from the prevalence of tuberculosis requires that every effort should be made to limit, if it is not possible to destroy, this scourge. It is gratifying that public sentiment is being aroused upon this question and that opportunity is afforded for the co-operation of public and private effort to attain the desired results. I recommend to the Legislature the adoption of such measures (including those already mentioned with respect to the milk and meat supply) which will tend to prevent the spread of this disease. Provision should be made for notification and complete registration of cases and for the dissemination of necessary information. There should be suitable appropriations made to permit systematic effort under the direction of the Commissioner of Health."

To begin and maintain the fight against this disease the Legislature of Pennsylvania has appropriated the sum of $1,000,000 —

a large part of which is " for the dissemination of knowledge relating to the prevention and cure of tuberculosis." In the opinion of those conversant with the situation not less than $75,000 should be appropriated for this work.

The resources of to-day's science of sanitation developed by sufficient means and sustained by an intelligent and awakened public sentiment shall so prevail that finally this common foe of man, this scourge of the race must pass away.

Mortality From Pulmonary Tuberculosis:

The following table shows the total deaths in the State; annual death rate per 1,000 population; reported mortality from tuberculosis, and deaths per 100,000 population due to tuberculosis since 1884; also percentage of deaths due to tuberculosis.

YEAR.	Population.	Total deaths.	Death rate.	Deaths from tuberculosis.	Deaths per 100,000 population.	Percentage of all deaths due to tuberculosis.
1885	5,540,360	80,407	14.6	11,238	203.0	14.0
1886	5,631,860	86,801	15.4	11,947	212.0	13.7
1887	5,723,360	108,269	18.9	11,609	202.0	10.7
1888	5,814,850	114,584	19.7	12,383	213.0	10.8
1889	5,906,350	113,155	19.2	12,390	209.8	10.9
1890	5,997,853	128,648	21.4	13,831	230.0	10 8
1891	6,255,600	129,850	20 7	13,445	214.0	10.4
1892	6,513,343	131,388	20.1	13,471	206.8	10 3
1893	6,607,790	129,659	19.5	13,123	199.0	10.2
1894	6,702,230	123,423	18.4	12,824	191.4	10.5
1895	6,796,670	128,834	18 9	13,267	195.2	10.5
1896	6,891,120	126,253	18.3	13,265	191.0	10.7
1897	6,985,560	118,525	17.0	12.641	181.0	10.8
1898	7,080,000	122,584	17.3	12,978	183.3	10 7
1899	7,174,450	121,831	17.0	13,412	187.0	11.0
1900	7,268,890	132,352	18.2	13,590	187.0	10.6
1901	7,428,580	131,461	17.7	13,766	185.3	10.6
1902	7,588,260	124,657	16.4	12,582	165.8	10.2
1903	7,747,940	127,602	16.4	13,194	170.0	10 4
1904	7,907,630	142,014	17.9	14,159	179.0	10.0
1905	8,067,309	137,222	17.0	14,064	174.3	10.3
1906	8,227,000	140,773	17.1	14,026	170.4	10.0
1907	8,425,332	147,830	17.5	14,431	171.0	9.8

THE POLLUTION OF OUR STREAMS

A fact most gratifying to record is that during the past two years, marked and increasing progress has been made in lessening the pollution of our rivers, streams and lakes. That public sentiment

is more and more actively supporting the position of the Department in this important duty is unquestionably due to the general dissemination of knowledge concerning the dangers of unrestrained pollution. It is a striking illustration of the fact that you must first educate and then advance. In some cases you educate by advancing. But in this matter, so far-reaching were its consequences, so many important interests, both public and private, were vitally interested, so many difficulties and peculiar embarrassments were in the way, that it was essential that the people should see as clearly as possible the imperative and urgent necessity for this sanitary reform before much progress could be made. That there is now throughout the State a general sentiment that our waters must be purified, there can be but little doubt; when occasion arises it must be crystallized, specially informed, and wisely directed.

It is needless now and here to again enter upon an elaborate discussion of the dangers of polluted and infected waters. If we estimate that 20,000 cases of typhoid occur in New York State in one year with 2,000 deaths, the money lost to the State is easily figured. Allowing each life to be worth $3,000, a low estimate, as the young and vigorous are most often victims, and estimating that 15,000 of the 20,000 cases were men and were kept from labor forty days, and putting the value of a day's work at $1.50, the total pecuniary loss to the State amounts to $7,000,000. We know without telling what misery and suffering were caused by these thousands of cases, what grief and distraction occurred when death entered hundreds of homes; and to this must be added the very serious business loss of a community when the disease occurs in any way approaching epidemic form. Let us remember also the danger of infection by tuberculosis — a danger more serious and grave, I fear, than it is at present supposed to be.

Then, too, when the stream is not infected the conditions of pollution existing cause a disfigurement of its natural features often peculiarly repulsive. The banks are covered with deposits offensive to both sight and smell; dirty and slimy scum floats on the surface of the stream and accumulates in eddies and coves; the bed of the river is covered with a viscid material that rises promptly when disturbed, and yields to the grieved nostril a

pungent odor peculiar to itself. Fishing is impossible for there are no fish — boating, as a pleasure, is destroyed, the banks of the river no longer yield enjoyment. The comfort and enjoyment of the people living along such a stream are impaired and sometimes totally destroyed. We are all agreed that such conditions should not continue to obtain.

The policy of the Department remains as announced at Albany three years ago; that the continued pollution of our waters must cease. It does not expect this pollution will cease in a day nor in a year, but it does expect that within a comparatively short period it will be entirely stopped.

In my report to you last year on this subject may be found the following paragraph. It still describes the conditions existing and, therefore, it is quoted:

> "It must be clearly understood that the problems presented by the present pollution of our streams are not in any sense of the word simple ones. To select one town on a river and order it to construct a sewage disposal plant, regardless of conditions existing along that river, hinders rather than helps. To object to one sewer discharging when hundreds of others are pouring out their contents and are likely to indefinitely continue, may indicate interest, but demonstrates with painful clearness an absolute inability to grasp the situation.
>
> "Before any intelligent or coherent steps in direction may be taken concerning the purification of any stream, the entire watershed to which it belongs must be thoroughly studied.
>
> "The sources of water, character of soil, number of villages and towns, population of such, conditions of sewage, conditions of water supply, manufacturing establishments and their various wastes, maximum and minimum flow of the main river and its tributaries, all these things and many more must be learned before it can be intelligently decided whether the single town above referred to shall or shall not be required to put in a sewage disposal plant. In other words, this work of the purification of our streams must proceed along broad and comprehensive lines. Otherwise it will make no permanent and satisfactory progress. What should be done for

the Oswego river will be determined after such an investigation as the one above described has been made and the full reports and sanitary maps submitted. Then, and not till then, can it be decided just what is the proper and wisest thing to do."

During the past year comprehensive and thorough studies have been made of the Susquehanna, Oswego, Delaware, Niagara, Mohawk, Upper Hudson, and Lower Hudson. These investigations and studies are of the greatest possible importance in dealing with the question of water pollution. They afford the foundation for both present and future action. It need hardly be said that such investigations are costly both in time and money, but no more needed work has ever been done for the State.

APPROPRIATIONS

The growth and consequent extension of the necessary work of the Department has received the cordial recognition of the Finance Committee of the Senate and the Ways and Means Committee of the Assembly, nor has the Executive failed at any time to manifest his earnest interest in the progress made. But the increase granted last year, though relatively large, was yet only sufficient to enable the Department to successfully begin work on a number of most important lines (described in full under the work of the several Divisions) but not enough to carry on this work efficiently to a satisfactory conclusion.

It must be recalled that until very recently the appropriations for the State Department of Health were most meagre and insignificant, and that the greater part of the investigations now undertaken could not be carried on because of lack of means. There can be no service without means; there can be only inadequate service with insufficient funds; there can be efficiency in its fullest sense only when the appropriation is enough to meet actual needs.

It is not proposed to so indefinitely extend the energies of the Department as to embrace all things that might be conceived by a fertile imagination as coming within the domain of sanitary science. It is proposed to limit the work undertaken to that which

experience has demonstrated to be practical and which, if a proper care of the public health is to be maintained, requires prompt action. But to do this work pressing for accomplishment, a certain level of appropriations is requisite. It has not yet been reached.

We are still severely crippled in the amount allowed for "Investigations," "The Division of Laboratory Work" and the "Division of Engineering." These are the great centers of strength in the Department. If investigations must cease, if the multifarious laboratory be narrowly limited, if the engineering division lack means, there will necessarily ensue a large cessation of efforts and incomplete and unsatisfactory results. An increase of at least $30,000 is needed along the lines mentioned above.

RECOMMENDATIONS

I beg to recommend the following changes in the Health Laws which I believe to be directly in the interests of the public service.

First. The Department has at present the authority to check the further pollution of the streams of this State by refusing to grant permits for the discharge of raw sewage, and it is consistently exercising this power in proper cases, and has required the construction of many sewage disposal plants. The investigations that have been conducted during the past year of the watersheds of the State, were for the express purpose of determining what the policy of the Department should be, the necessity for establishing the degree of purification that must be obtained, and for preserving the waters of the State for future use.

While the provisions of the law conferring this authority on the Department are wise as far as they go, I believe the Department should have the authority to order the sewage of a municipality or manufacturing wastes, to be removed from a stream, and I think it desirable that such an order should receive the approval of the Governor. In this way progress that could be made in relieving the pollution would be much more rapid.

In connection with the work the Department is doing in the repeated examinations of public water supplies and in efforts to protect them from contamination, such authority would be of great assistance. The State has provided for the protection of the pub-

lic water supplies and the control of their purity, laws which will — with the application that is at present being made — result in a great improvement along these lines. But the law should go a step further and enable the Department to take immediate action to relieve the pollution of the stream where investigation shows it to be necessary.

The Department has no more important function than that of the perfection and control of the water supplies of the State and it will bend every energy to make that control as perfect as possible under existing conditions.

Second. An amendment to the Vaccination Law to take out of the hands of the trustees of school districts the authority to enforce the law and place it entirely in the hands of the local boards of health.

Third. I would recommend a law compelling the registration of all cases of tuberculosis.

Fourth. I would recommend that the law regarding vital statistics be so amended as to secure a more complete registration.

Fifth. I would recommend the passage of an act designed to enable the counties of the State to have a county laboratory working in co-operation with the State laboratory and the State Department of Health.

Sixth. Attention is called to my recommendation of last year regarding the Pure Food Law. As there has been no change in the situation the remarks made at that time are still pertinent. The work of enforcing the law should be under the control of one department with adequate funds to place the State in the front ranks in this work.

THE SANITARY ENGINEERING DIVISION

Probably no better evidence of the increasing public interest in matters pertaining to stream pollution and the protection of public water supplies can be given than the increase in the amount of work performed by the Division of Sanitary Engineering during 1907.

This Division has just completed the first full year of its reorganization, or more appropriately of its existence, and the de-

mands which have been made upon it from individuals and communities in every section of the State is proof of not only the increasing importance attached by them to these vital questions, but of the great need of intelligent and expert guidance in the solution of the many and perplexing problems that are continually arising before them.

In my annual reports for 1905 and 1906, I described somewhat in detail the various lines of work that should be followed and the more important duties that should be undertaken by an efficiently organized Division of Sanitary Engineering. The results accomplished during the past year seem to clearly indicate that not only is this Engineering Division now organized upon a firm basis, but that the work is being executed along lines and under methods productive of the greatest practical results. These lines of work and the methods employed will, therefore, be closely followed in the future and will form a basis for the future development of the work of this Division.

In reviewing the work of the Sanitary Engineering Division for 1907, it will be only possible, owing to the diversified nature of the work and the brief space here allotted, to refer to the more important matters that have received attention. These will be taken up and briefly described under general headings, as follows:

Protection of Public Water Supplies:

Probably no division of public health work is so fundamentally vital or so far reaching in its effect upon the health and lives of our people as the most important duty imposed by the Public Health Law, and may be considered the objective point upon which is focused nearly the entire work of the Engineering Division.

The Public Health Law provides that the public water supplies of the State shall be protected by specific rules and regulations provided and enacted by the State Health Commissioner upon application from the local board having control of the supplies. The law further provides that no sewage shall be discharged into any waters of the State without a permit from the State Health Commissioner, who shall prescribe the conditions upon which all such discharge of sewage shall be permitted. These two provisions of the Health

Law, then, afford the basis of the engineering work of protecting our streams from the abuses of sewage pollution, and our water supplies against the dangers of sewage contamination.

This specific work of protection of supplies involves in the cases of new rules a careful examination of the watershed in order to determine the local conditions, requirements and prohibitions necessary to the framing and enactment of the rules. In other cases it involves special or regular inspections of watersheds to determine whether, and to what extent, these rules have been complied with. Under these two-fold duties, then, a large amount of the work of the Engineering Division has been performed during the past year relating to the water supplies of the following municipalities:

Auburn,	Monticello,	Saranac Lake,
Avon,	Mechanicville,	Syracuse,
Canastota,	New York city,	Troy,
Dolgeville,	New York Inter-	Utica,
Geneseo,	urban Water Co.,	West Point,
Hudson,	Mt. Vernon,	Yonkers.
Livonia,		

In addition to the above work of protection of water supplies of the State, which are protected by rules and regulations, the Department is frequently called upon for specific investigations or inspections of supplies where rules have not been enacted. This work is the result of a voluntary appeal to the advice and assistance of the Department by local officials or water boards. These appeals for advice of the Department involve many questions, such as selection of suitable sources of supplies, approval of plans for water purification, and the protection of their supplies against local or general sewage pollution.

These requests and appeals for advice and approval of plans and procedures relating to new supplies, are, as stated above, voluntary and hence informal. They should, however, be made the subject of official application and of final approval of the State Health Commissioner, as is required in cases of applications for permits and approval of plans for sewer systems and sewage discharge in the State, and in accordance with the custom and Public Health

Laws relating to public water supplies adopted in other States, such as Massachusetts, Pennsylvania and Ohio. The municipalities from which these voluntary appeals have been received, and where engineering work of inspection and investigation has been performed, and advice and assistance rendered, include the following:

Albion,	Piercefield,	Ticonderoga,
Brockport,	Poughkeepsie,	Valatie,
Moravia,	Richville,	Wellsville,
Niagara Falls,	Sharon Springs,	Whitehall.

Attention was directed in the two preceding annual reports to the necessity of extending the scope of this important work of the Department. The large amount of work which has been accomplished during this year with an engineering force entirely inadequate for the purpose has been proof not only of the great need for this class of work throughout the State, but a strong plea for the recent substantial increase in the engineering staff of the Department. With this increased staff this work has been vigorously pushed during the year 1907, when in addition to the work properly included under the more routine duties referred to above, special investigations of much broader scope and greater specific importance have been carried on. These investigations will be referred to later under "Sanitary Surveys of Watersheds" and "Sanitary Inspection of Cities."

Sewerage and Sewage Disposal:

The work of the Engineering Division in regard to these two important questions comprises the greater part of its routine duties. It covers a considerable amount of detail in the examination of plans for new systems of sewerage and sewage disposal and for modification and extension of existing systems; in the examination and filing of reports and maps submitted in accordance with the 1903 law; and in the issuing of permits for the discharge of sewage from these systems, manufacturing industries and private dwellings. Many questions also arise in regard to proposed or existing systems of sewers which, though not included in the above, do affect questions of water supply and the public health, and these frequently require special investigations and reports.

Finally, a considerable amount of detail work has been undertaken voluntarily by the Department during the past and previous years in the preparation of preliminary plans and reports for sewerage and sewage disposal of State institutions.

The character and extent of the work involved in the examination of plans for sewerage and sewage disposal was described rather fully in my last annual report, and will not be reviewed again at this time. Lists will, however, be given of the cities and villages which, during 1907, have submitted plans for sewerage and sewage disposal, or for extensions of existing systems; which have submitted reports and maps under the 1903 law; or where permits for the discharge of sewage or factory wastes have been applied for:

List of Cities and Villages which have Submitted Plans for Sewer Systems or Extensions, or in which Permits have been Applied for:

Alden,
Almond,
Auburn,
Avon,
Bainbridge,
Binghamton,
Bolivar,
Bronxville,
Canandaigua,
Castile,
Central Bridge,
Chatham (town),
Cohoes,
Dover Plains,
Dryden,
East Martinsburg,
Ellisburg,
Elmira,
Fort Edward,
Fulton,
Greenburg (town),
Greene,
Greenport,
Harrison,
Hermon,
Hornell,
Irondequoit (town),
Kenmore,
Lakeville,
Lancaster,
Lestershire,
Lockport,
Marion,
Massena,
Matteawan,
Mechanicville,
Medina,
Merrickville,
Mohawk,
Mount Kisco,
Montefiore Home,
Niagara Falls,
North Olean,
Ogdensburg,
Owasco Country Club,
Palmyra,
Perry,
Poland,
Richfield Springs,
Rochester,
Salamanca,
Schenectady,
Silver Creek,
Tuckahoe,
Waverly,
Watertown,
Willard,
Yonkers.

List of Cities and Villages which have Submitted Reports and Maps Under 1903 *Law:*

Elmira,
Fredonia
Geneva,
Hornell,
Hudson,
Kenmore,
Mechanicville,
Ogdensburg (report received; map to be submitted by Feb. 1, 1908),
Olean,
Peekskill (report received; map unsatisfactory).

Of the general investigations, relating to sewerage and sewage disposal, not specifically included under "Plans and Permits," very little can be stated as to their specific character. Each case arises from some peculiar local condition, and presents a problem of a special nature to deal with. Many, if not most of these cases, relate to unsanitary conditions arising from congestion of population where opportunities for drainage or sewerage are unfavorable, where the sewerage system is inadequate for the needs of the community, where proper means for sewage disposal are not employed, or where a sewage purification plant is not operating satisfactorily. In these cases the work of the Division is mainly devoted to a solution of the problem in a preliminary way and of outlining to the local authorities or community affected the proper course to pursue in order to remove the objectionable conditions or secure the needed improvements.

The municipalities where investigations of this, or a similar, nature have been undertaken, and advice to the local authorities given, or action by the Department taken, are as follows:

Amsterdam,
Batavia,
Burdett,
Cornwall-on-Hudson,
Dunkirk,
Ellisburg,
Elmira,
Fort Edward,
Fredonia,
Fulton,
Gloversville,
Harrison (town),
Herkimer,
Hermon,
Holland Patent,
Mohawk,
New Rochelle,
North Tonawanda,
Ogdensburg,
Olean,
Owasco Lake (S. H Adams),
Owego,
Patchogue,
Poughkeepsie,
Richfield Springs,
Sea Cliff,

Sharon Springs,
Tarrytown,
Thompson Ridge,
Tuckahoe,
Utica,
Watertown (sewage disposal),
Watertown (question of plans for sewers),
White Plains.

The work performed by the Division in the preparation of plans for State institutions, during the past year was mainly in the completion of plans and reports started in 1906. During that year plans and reports were completed for the following institutions:

Kings Park State Hospital, Long Island,
Rome Custodial Asylum.

Although considerable work had been carried on during 1906 in the preparation of plans for other institutions, they were not completed until in the year 1907. The institutions, then, with respect to which detailed plans and reports were completed during 1907, are the following:

Newark Custodial Asylum,
Rush Industrial Institution,
Western House of Refuge at Albion.

Investigations of Stream Pollution and Other Public Nuisances:

The occurrence of public nuisances in the past has been the cause of numerous complaints from municipalities and individuals in every section of the State. They seem to be an inevitable corollary to the growth and concentration of population, especially in villages where, either from their unfavorable location with respect to disposal of sewage, or from financial reasons, the expenditure of funds for sanitary improvements is difficult or impossible. It is probable, therefore, that nuisances will continue to be a source of frequent complaints, and of action by the Department, in the future.

These public nuisances vary considerable in character and in the causes which lead to their existence. Some affect health and life, such as those resulting from pollution of wells and small streams by domestic sewage; while others affect comfort and con-

venience, such as pollution of streams by industrial wastes, or the noisome odors emanating from improper garbage disposal and offensive trades. Unfortunately, many cases are necessarily referred to the Department by local health officers, or other officials, owing to a failure to shoulder responsibility, or a fear of engendering a local ill-feeling. These complaints should in the majority of cases be the subject of investigation and abatement of cases by the local boards, who have ample authority and power to act under the Public Health Law.

Owing, then, to the large number of these public nuisances, which have required the attention of this Division, and the fact that most of them have merely a local interest, only the more important cases will be included in the following list of municipalities where public nuisances have been investigated and reported upon:

Alden,
Allegany,
Amsterdam,
Auburn (Owasco Lake outlet),
Bedford (T.),
Bemus Point,
Big Moose Lake,
Brighton,
Cadosia,
Canandaigua,
Canisteo River (Hornell),
Dexter,
East Salamanca,
Fourth Lake,
Glenfield,
Glen Cove,
Goshen,
Gouverneur,
Green Island,
Greenport,
Greenwich,
Hancock,
Hermon,
Holley,
Hudson,
Kaaterskill Creek,
Lake Champlain,
Lake Placid,
Larchmont,
Lestershire,
Little Falls,
Middletown,
Montour Falls,
Old Forge,
Onondaga Valley,
Pond Eddy,
Pine Bush,
Poultney River,
Rensselaer (gas house pollution),
Rome,
Riparius,
Rye — Port Chester,
Schenectady,
Seneca Falls,
Sharon Springs,
Susquehanna,
Tannersville,
Tioughnioga River (Cortland),
White Plains.

Investigations Ordered by the Governor:

During the year 1907 two important investigations were undertaken in accordance with special order of the Chief Executive, acting under the provisions of section 6 of article 1 of the Public

Health Law. These investigations were made the subject of special studies and reports, and were in relation to the following:

1. The pollution of the Upper Hudson river and its tributaries by wastes from pulp and paper mills and other industrial establishments.

2. The pollution of the Grasse [or DeGrasse] river by the wastes from the DeGrasse Paper Company at Pyrites.

In both of these investigations the combined resources of the Sanitary Engineering Division and the Hygienic Laboratory were called upon. The questions at issue were vital, not only in their relation to the health and comfort of the residents of this particular section of the State, but also the broader and more comprehensive problem of the proper disposal of domestic sewage and industrial wastes in the entire State. Although considerable time was consumed and much detailed examination and study were expended upon the two investigations, a large amount of valuable information was obtained and important conclusions were reached.

In addition to the above investigations carried out under specific Executive order, other investigations have been referred to the Department from the Executive Chamber. They have been in the nature of complaints of lesser importance, but have, nevertheless, been made the subject of careful investigations and reports. These investigations were in relation to the following:

1. The pollution of Kayaderosseras creek by the wastes from the Union Bag and Paper Company at Ballston Spa.

2. The pollution of Hutchinson canal by the sewage of the city of Mt. Vernon and the villages of Pelham and Pelham Manor.

3. The pollution of Catskill creek by the sewage and industrial wastes of the village of Catskill.

These investigations were undertaken and reported upon in a manner similar, though in a less extensive way, than the more important ones referred to above.

Special Investigations Relating to Public Health:

It is not only important in a Division of Sanitary Engineering that all current and routine duties be properly and promptly attended to, but it is equally important, if a high standard is to be

maintained or practical results assured, that investigations or studies of a special nature be undertaken to the full extent of its resources. Very fortunately it has been possible for the Division of Engineering to undertake during 1907 a number of special investigations, which have proven to be of great value. These investigations have covered a wide range of subjects, and have in many instances resulted, either directly or indirectly, in the carrying out of public sanitary improvements in localities where they were made. They have incidentally also furnished a large amount of statistical information that will be of considerable value to the Division in the routine of its duties.

The special investigations, which were either completed or were in progress at the close of the year, will be taken up in order and briefly described:

Sanitary Surveys of Watersheds:

Statistics in regard to the location and number of sewer outlets of municipalities and industries, as well as other sources of pollution, may be considered as one of the working assets of the Division of Sanitary Engineering. This information is essential to the proper solution of many, if not most, of the problems that arise in regard to the protection of public water supplies, including specifically the operation of sewage disposal of the municipalities of the State and the issuing of permits for the discharge of sewage into the waters of the State.

To gather the information, it must be done systematically, and to this end sanitary surveys were undertaken during the year covering the watersheds of the Oswego, Hudson, Mohawk, Susquehanna, Genesee, Alleghany, Black and Oswegatchie rivers. Of these investigations, the field work has been completed with all of them, and reports have been submitted in the cases of Oswego, Upper Hudson, Genesee and Mohawk rivers. The reports covering the remaining watersheds will be completed at an early date.

It is planned to continue this important work systematically in the future until the entire State is covered. As this work progresses, it is also proposed to tabulate these statistics and transfer them to specially prepared maps for the convenient reference and use of the Division.

Investigations of Sewage Disposal Plants:

These investigations were for the purpose of determining the number, operation and efficiency of the sewage disposal plants in the State. For many years plans for sewage disposal works have been approved by the Department, and permits for sewerage works have been granted, subject to the construction of sewage purification plants as an essential condition. The Department has no record of any inspections made of any cities to whom such conditional permits have been granted, nor has the Department had any means of knowing whether the plans approved have been even approximately followed in construction. It seemed, therefore, fundamentally essential, before undertaking to inspect the operation and to pass judgment on the efficiency of the sewage disposal plants of the State, that a correct list of such places should be made with a description of their intended method of operation.

This work was carried out in the months of June to September, inclusive, by an assistant especially trained in this field of work. With a description of each plant block plans were prepared to make the description intelligible, and photographs taken to show the conditions at the time of the inspections. This report is at present in progress of preparation and will soon be completed.

Sanitary Inspection of Cities:

This investigation included the inspection of certain cities of the State whose typhoid fever death rates were above the normal, with a view of discovering, if possible, the causes for such high death rates, and of then insisting as far as possible on the removal or remedying of such causes. The average typhoid fever death rate of the State for the past five years has been 21.7, while the death rate for the State of Massachusetts for the past five years was only 18.0.

Since many of the cities of the State have typhoid rates above 50, it is manifest that the most direct way of reducing the death rate of the State is to reduce the death rate of those cities where the rate is highest. The following six cities were selected, all with high death rates from typhoid fever, viz.: Cohoes, Niagara Falls, Elmira, Poughkeepsie, Ogdensburg and Newburgh. In the case of each city studies were made of the topographical, geological, in-

dustrial and sociological peculiarities of the locality; of the water supply and sewage conditions; of the milk and ice supplies; of garbage collection and disposal; and an analysis of mortality statistics. The statistical information has been gathered for all of these cities referred to and reports completed in the cases of Ogdensburg, Niagara Falls and Poughkeepsie. The reports for the remaining three cities have not yet been completed.

These investigations have proved of great practical value, for, based upon the findings and conclusions reached in each case, definite and valuable recommendations could be made to the local authorities having charge of the respective public improvements. Many of these investigations have developed into a subsequent special investigation of the city's water supply, which has involved not only the Division of Sanitary Engineering, but the Division of Hygienic Laboratory, which contributed largely, from the standpoint of chemistry and biology, to the information regarding the purity of these supplies. It is also a gratification in this respect to record that, in the case of municipalities where recommendations have been made, immediate steps have been taken by the local authorities looking to the carrying out of these recommendations.

Sanitary Condition of Summer Resorts:

This investigation comprises a series of visits or inspections of summer hotels in the State. On one railroad line alone are to be found nearly 2,000 boarding houses or hotels, the capacity of which is not far from 50,000 people. A large number of these are under the supervision of the health officer of the village or town where they happen to be located. But mountain camps, farm boarding houses, and even large hotels in the mountains are often beyond the reach of regular health officers, even if a small community felt justified in assuming such control and attendant expense.

It would appear, therefore, that if the large number of summer recreation seekers are to be protected in health while at summer hotels, the protection must come from the State authorities. The conditions in existence at present have been found to be revolting

in the extreme. In several cases drinking water was taken from a shallow well, surrounded by privies and cesspools. In a number of cases the sewer of the hotel discharged into the same pond or lake from which the water supply for the house was taken, and only a few feet away. In one hotel, indeed, the two pipes were laid in the same trench to save expense. In about 75 per cent. of the places inspected, the conditions were not seriously bad, but in the other 25 per cent. the conditions called for immediate remedy.

Owing to lack of adequate engineering assistance this investigation was only partially completed. The information that was secured, however, was at once utilized, and notices were sent to all offending parties that the sanitary conditions must be remedied before the opening of the next season. In addition to these notices, considerable advice was given as to the nature, extent of the improvement, and in some cases the type and arrangement of disposal plants, that would meet the requirements of this Department.

The results of this investigation show so clearly the danger that lies in the unsanitary conditions surrounding many summer resorts and the importance of protecting this growing population of pleasure and health seekers, that it is important that this work be continued and extended in the future.

Investigation of Ice Supplies:

In a special report to you in the early part of the year I called attention to the lack of definite statutory power vested in this Department covering the protection of ice supplies of the State. I also called attention to the fact that, although in general most of the ice supplies of the State are either secured from sources not appreciably contaminated, or are subject to natural processes of purification, that render them safe for domestic purposes, there were many supplies so located, or in which the conditions of harvesting were so carried on, as to render them unsafe hygienically for domestic purposes, especially if used for cooling by immersion.

Many of the ice supplies in the latter case are taken from fields located along rivers in the vicinity of sewer outlets, where natural

processes of purification do not protect them to a degree that would be considered safe. The larger and more important of these are located along the Hudson and Mohawk rivers, and an investigation is now in progress covering the ice supplies along these rivers.

This investigation will be of a two-fold nature; an examination of the location of the ice fields with respect to their proximity to sewer outlets and other influences of a contaminating nature; and chemical and biological studies of the composition and character of the ice itself. At this date some 75 to 100 ice houses have been inspected, and the sanitary conditions surrounding their location, and with respect to the harvesting of the ice, have been recorded. This important work will be continued during the present "harvesting" period and will be further supplemented by laboratory work during the following period of "storage" and "distribution."

Investigation of Illegal Construction of Sewers:

If our Public Health Law is to continue upon the statute books for any purpose more serious than a mere testimonial of literary achievements, or an historical record, it is surely there to be enforced. Without entering into a discussion of the merits or failings in the practical operation of this law, it should, however, be emphasized that, notwithstanding the many sections containing prohibitions that carry no provision for enforcement, there are some sections of the law, and very important ones too, that do provide very explicitly certain requirements, and at the same time provide a definite procedure for their enforcement.

One of these is section 76 of article V of the Laws of 1903, which specifies that in the cases of all municipalities that contemplate the construction of new sewerage or sewage disposal systems, or extensions of older ones subsequent to the passage of this act, these municipalities shall first submit plans to, and have them approved by, the State Commissioner of Health. Unfortunately, however, either through ignorance, but more probably willful disregard, or perhaps a feeling based more or less on the inactivities of the Department in former years, this section of the law is considered by some to be more or less of a dead letter. It is with a purpose of correcting such ignorance, neglect or mi

taken impressions, that steps have been taken to investigate the municipalities in the State where sewers are being constructed in violation of section 76.

Although this investigation was started very late in the year, it has already been possible to obtain a list of a considerable number of municipalities where, it is believed, illegal construction has been and is being carried on. It is my purpose to accumulate the required evidence in regard to these municipalities, and to take the necessary steps to bring the cities into line as to their duties under the Health Law, or to refer the cases to the Attorney-General and have the penalties imposed for the violation of the law.

THE DIVISION OF LABORATORY WORK

State Hygienic Laboratory:

The second appropriation made for the work of the State Hygienic Laboratory while larger than that for the first year, was still too small to undertake all the lines of investigations in chemistry and bacteriology which the Department should undertake at the earliest possible moment. The work of this laboratory during the year 1907 can be divided into four general parts:

First.— The investigation of municipal and other water supplies, and sewage disposal plants, including the investigations of typhoid fever epidemics.

Second.— The laboratory diagnosis of various infectious diseases, together with field investigations of outbreaks of such diseases.

Third.— The special examination of foods, illuminating oils, and other special investigations.

Fourth.— Education work in connection with the State Sanitary Institute in all of the above three lines of investigations.

Examination of Municipal Water Supplies:

During the year fifty investigations of water supplies of municipalities or supplies used by public institutions have been made, and samples of water have been collected and forwarded to the laboratory and there submitted to careful examination either bacteriologically or chemically, or by both methods. Most of this work has been carried out on the water supplies of the smaller

municipalities. It has, of necessity, been somewhat preliminary in character, and in many instances the work has not been sufficiently extensive to warrant drawing definite conclusions as to the sanitary quality of the supplies in question; in other cases, even the preliminary work has been more than ample to show that the supplies were altogether bad from a sanitary point of view. It became apparent early in the work that some plan of class co-operation between the laboratory and the local authorities would be necessary in most instances. In some cases, however, the local situation demands that the laboratory staff undertake the regular collection of the samples as well as their examination, and this will require a considerable addition to its force of field workers.

These preliminary examinations of the municipal and institutional water supplies have shown that they can be grouped in a general way under three heads as far as their sanitary quality is concerned:

The first group consists of those supplies of excellent quality. It is part of the plan of the Department to have these supplies examined at occasional intervals. Of the fifty supplies examined, five belong in this group.

The second group consists of supplies, the sanitary conditions of which are more or less open to question. Examination of the same should be made at regular intervals, either monthly or bimonthly. This group consists at present of thirty-five water supplies.

The third group consists of supplies, the quality of which is either open to very strong suspicion or is notoriously bad. Of these there are ten. It is the intention of the Department to examine these at short intervals, and upon completing a series of such examinations action will be taken for the purpose of remedying the dangerous conditions.

In the report of the Director of the Laboratory the fifty supplies referred to are considered in detail under these three heads.

With the scientific data already collected and that to be gathered in a continuance of this plan, definite action can be taken toward the remedying of dangerous conditions of municipal water supplies and is a most important movement in the direction of the absolute prevention of outbreaks of typhoid fever and other water-

borne diseases. It is the highest type of public health work and should be well supported.

Some of the conditions which the Department has discovered through the work of the State Laboratory would seem to indicate that something wet was the only standard for quality of certain water supplies. On the other hand there are many places where the original supplies were of good quality but the municipality has outgrown the supply, or the latter in times of drought has failed to give the needed amount of water and auxiliary supplies or make-shifts of unsatisfactory quality have been brought into the water systems. Still other places have filters that are such in name only and are not producing satisfactory results. Others are faulty in design, and still others show that the only element that receives consideration is that sufficient water passes through them. Such filters are worse than useless, inasmuch as they give a false sense of security and are in no way a safeguard if the water which they intend to purify is polluted. Many of these conditions can be remedied at comparatively small cost, and in others a large improvement in efficiency can be obtained by the subordination of convenience of pumping and other unimportant factors to the one essential point of obtaining a satisfactory effluent. It may be said perhaps of the majority of the filtration plants in the State that the scientific and technical supervision of the same is not what it should be. The Department through the State Laboratory can undoubtedly be of much assistance to the municipalities in this direction. It can also render much valuable aid to such municipalities as are considering the development of a new or additional water supply. It has done so in several instances already.

In addition to this systematic work on municipal supplies, 565 individual samples of water sent in from various sources for examination have been subjected to bacteriological or chemical examination or both; and reports have been made to local health officers giving the results of such analyses. A very much larger number of these samples could have been accepted and examined, but to do so with our present facilities and the size of our existing staff would have necessitated the discontinuance of the work already referred to.

The laboratory has also devoted a very considerable amount of time and energy to assisting the Division of Sanitary Engineering in the investigation of the pollution of the upper Hudson, the pollution of the DeGrasse river, the sanitary survey of the Oswego watershed, and the sanitary investigation of the Niagara river. It has also made a preliminary bacteriological investigation of a number of the supplies of ice housed in the ice houses upon the Hudson river in the vicinity of Albany, and is now co-operating with the Engineering Division in a much more extensive investigation of the ice supplies of the entire Hudson valley district.

Plans have been formulated for the systematic examination of the efficiency of all the sewage disposal plants in the state, but owing to lack of funds during the year prior to October they have not been carried out. It will be begun immediately; but in order to continue it as it should be additional appropriations will be necessary.

The appropriation made in the Supply Bill of 1906 for the investigation of the subject of sewage disposal was extended in investigations at the Sewage Disposal plant of Saratoga Springs, the report of which will appear in full in the report of the Director of the Laboratory. The funds were exhausted by July 1, 1907, and it was necessary to discontinue this investigation.

The Department has been frequently very seriously embarrassed in its effort to prevent the pollution of streams and lakes by its inability to offer any definite suggestions to those responsible for such pollutions, whereby trade wastes and other refuse materials could be successfully removed from the waters discharged into these streams by industrial institutions. While investigations have been made in other parts of the country looking toward the solution of the problems involved in the discharge of such waste into streams, practically nothing has been done in this State with the object of obtaining scientific data which would enable these industries to cease polluting our streams; and the Department has not been in a position to inform those responsible for these contaminations whether the results of investigations made elsewhere were applicable to the problems presented in this State.

The time has arrived when these problems should be studied in the light of our conditions in order that the Department may be in

a position to definitely determine whether the removal of these offensive wastes from our water courses is practical or possible without absolutely prohibiting the operation of these industrial institutions. To close down such factories and mills would, in many instances, destroy the material prosperity of the community in which they are located and yet at present and in some cases at least no other course is open unless the Department is prepared to permit the continuance of the discharge of refuse into the water courses. A special appropriation should be made for the study of these problems under the practical conditions as they exist in several important localities in this State. Only in this way can the Department obtain the data necessary to render a satisfactory decision as to the course which should be pursued in these cases.

The Director and the Sanitary Chemist of the State Laboratory have conducted field investigations into the causation of typhoid fever epidemics in fourteen communities. In eleven of these it was determined that polluted water supplies were the causes of the outbreaks. This record is sufficient to show the importance of the continuance of the routine examination of public water supplies of small communities. Only two of the eleven outbreaks occurred in cities; and others were all located in the larger villages. Detailed reports of the investigations of these outbreaks will be found in the report of the Director of the Laboratory.

Laboratory Diagnosis of Various Infectious Diseases:

The laboratory work in the diagnosis of infectious diseases has more than doubled during the past year, and there is still great need for development in this field. If the appropriations permitted the work should be put on a much more elaborate basis and plans should be undertaken toward the co-operation of the State Hygienic Laboratory with those county laboratories already in existence and those about to be established. It is noteworthy that a great increase in the number of specimens of sputum sent to the State Laboratory for their examination for tubercle bacilli has taken place. This is an indication of the great value of the anti-tuberculosis campaign which, because of lack of funds, has only just been started by the Department in this State. Undoubtedly the number of specimens examined during the coming year will

again be four times the number examined the year just prior as was the case this past year. Here again the appropriations for the State Hygienic Laboratory should be increased in order to properly carry on the greatly increased work which will be forced upon it.

Field Investigations:

Owing to the lack of sufficient funds field investigations in communicable diseases other than typhoid fever were undertaken in but one instance, namely, in the case of a prolonged outbreak of diphtheria in Southampton, Long Island. Numerous outbreaks of diphtheria occurred in other communities and if the staff of the Laboratory had been large enough to permit field investigations would have been made in these instances and would undoubtedly have resulted in the checking of the epidemic, as was the case in Southampton. It is impossible for localities to thoroughly study, determine the cause and thereby cut short such outbreaks, inasmuch as a very considerable amount of technical training and skill is required, together with the necessary bacteriological outfit which is not available in most of the small communities of the State.

***Special* Investigations:**

The efforts of the State Laboratory in the examination of foods have been confined to the examination of a second series of canned meats, a report of which was published in the July *Bulletin* of the Department, together with a preliminary report upon the adulteration of beers.

The Laboratory has been conducting a more thorough and exhaustive investigation of the beers brewed and sold in this State, and also of the bottled whiskies found on sale in various municipalities. The complete report of this work will soon be issued.

The State Laboratory has also conducted the examination and analysis of a number of illuminating oils, the report of which was published in the July number of the Department's bulletin.

Numerous small investigations of suspected adulterated or poisonous foods have been conducted, but owing to the lack of a definite appropriation no routine work other than that mentioned above has been conducted, the results of which would assist in the enforcement of the Pure Food Law.

Educational Work:

The staff of the State Laboratory has taken a most active part in the educational work conducted by the State in connection with the State Sanitary Institute and the Annual Conference of Health Officers. The Director of the Laboratory has read papers and given addresses on various technical subjects, particularly those relating to the transmission of typhoid fever and the prevention of tuberculosis before fifteen scientific societies or other medical or public health organizations.

The sanitary chemist has likewise contributed three addresses on problems relating to the filtration and purification of water.

The entire staff of the State Hygienic Laboratory, including that of the Bender Hygienic Laboratory, contributed toward the educational work of the Department in holding a laboratory course for health officers in Albany during the last week of April. The inauguration of these laboratory courses has been received with great enthusiasm by the health officers who have attended them and the educational work in this direction should be very greatly extended. In no other way can the practitioners and the physicians of the rural districts come in such close touch with the advances made in technical sanitary science than in attendance upon these laboratory courses.

In addition to the educational work already mentioned, the staff of the State Hygienic Laboratory supervised the construction of the hygienic exhibition of the Department and have acted as the demonstrators of the same as it has been presented at the Annual Conference of Health Officers at Buffalo, and on five other occasions during the latter part of the year. This exhibition consists of models of various methods of filtering and purifying water and sewage, of charts, tables and diagrams illustrating the various conditions brought out by the investigations of outbreaks of typhoid fever, and also includes the Traveling Bacteriological Laboratory of the Department.

The Director of the Laboratory has likewise devoted a very considerable amount of time, attention and energy to the development of the educational work of the Department in the prevention of tuberculosis. The Traveling Tuberculosis Exhibition was constructed under his direction, and its demonstration in Buffalo

in connection with the Annual Conference of Health Officers, and in the cities of Utica, Rome and Troy in connection with the State campaign on the prevention of tuberculosis, inaugurated by the Department in co-operation with the State Charities Aid Association, has likewise been carried out under his supervision.

Antitoxin Laboratory:

The work of the Antitoxin Laboratory increased very materially during the year, the distribution of diphtheria antitoxin being nearly one-half larger than last year. This increase was particularly noticeable during the latter part of the year, and if the same keeps on additional appropriations will be needed for the proper conduct of the increased work. The appropriation bill passed in the spring, the funds from which became available October 1st, provided for the distribution of the diphtheria and tetantus antitoxins in aseptic tubes, which is understood to mean their distribution in syringes of such construction as to enable the physician to rapidly administer the antitoxin without the necessity of purchasing a special syringe for this work.

The work of obtaining a properly constructed syringe for this purpose, which will be free from the defects of existing syringes, and which will yet be within reasonable limits of cost, was a matter for considerable investigation and study. Plans are well under way in this direction, and a very superior syringe has been designed, and the Department antitoxin will shortly be distributed in them. The distribution of the antitoxin in this way will unquestionably increase the amounts used by the physicians in the treatment of cases of both diphtheria and tetanus, and great benefit to the people of the State will result from this improved method of distribution.

Considerable sentiment has been expressed in various quarters calling for the free distribution of antitoxin to all those making requisition for the same, regardless of their financial condition. The work of the Antitoxin Laboratory has not only saved thousands of dollars to the citizens of the State in the cost of this remedy, but has in addition saved may thousands of lives because of the quick availability of the antitoxin for the treatment and

immunization of those ill or exposed to the disease. It is well known that the most important factor in the treatment and prevention of diphtheria is the administration immediately after exposure or at the earliest possible moment after the onset of the disease, of suitably large doses of antitoxin. This is possible under State production and distribution of the remedy.

Only three conditions are necessary for the entire suppression of this disease:

First. A knowledge on the part of the general public that antitoxin is a sure preventive agent when administered before the development of diphtheria, and practically a sure cure when administered in large doses immediately after the onset of the disease.

Second. Immediate action on the part of the guardians of those exposed and the attending physician in the administration of the proper doses of antitoxin at these times.

Third. An unlimited supply of State antitoxin put up in proper syringes and available for all citizens irrespective of their financial condition.

The State can provide for the latter of these factors and can very greatly assist by a campaign of education in bringing about the requisite knowledge on the part of the public, mentioned under the first condition. The medical profession and those exposed will remain altogether responsible for the development of serious or fatal cases of the disease when the State has fulfilled its duty in the matter. The State, however, should be prepared to do its part and the Department will undertake to carry out any program laid down by the Legislature in this direction, providing it is given sufficient means to do so. The present appropriations for this work will not permit the entirely free distribution of diphtheria antitoxin to all who ask for it, regardless of their ability or inability to purchase the remedy.

CANCER LABORATORY

The cancer research work conducted at Buffalo has been continued along somewhat broader lines than it has been heretofore, and is making as satisfactory progress as is possible under the conditions of our present knowledge of the various accessory

branches of natural science. The ever increasing interest in cancer research has reached the point where organization appeared to be necessary for the proper exchange of ideas on this very important subject and an association for the study of cancer has been established in this country and the Cancer Research Laboratory at Buffalo has taken an active part in the organization of this society. The report of the Director of the Laboratory which appears in the Appendix outlines the work which has been done during the past year, and indicates the fields which the Laboratory feels should be undertaken during the coming twelve months. The importance of this problem warrants the expenditure of very considerable time, energy and money in the well-directed efforts towards its solution. The State in continuing this work should see to it that it is not allowed to assume a secondary position to other institutions doing similar lines of work inasmuch as the State Laboratory was the first established on a definite basis for the exclusive study of this subject.

DIVISION OF COMMUNICABLE DISEASES

The most striking features of the work of the Division of Communicable Diseases has been its rapid growth during the year. The correspondence has increased about four-fold. Monthly reports at the beginning of the year were received from only 24 per cent. of the health boards of the State; during the months of November and December they were received from 91 per cent. Individual report cards were received during the year to the number of about 10,000. It is quite evident, however, that as the interest in public sanitary matters grows, these reports are becoming more numerous and more valuable. Some localities are reported in full. Adding to these individual cases reported, those grouped in the monthly totals sent in from local boards of health, the Department received reports of 22,098 cases of tuberculosis; 20,024 cases of diphtheria and croup; 20,134 cases of scarlet fever; 31,539 cases of measles; 7,126 cases of typhoid fever; 957 cases cerebrospinal meningitis; 476 cases of smallpox, and 35 cases of ophthalmia in the newborn.

The reorganization of this division in July of this year was

followed by the appointment of a complete corps of twenty-five medical experts. These experts are men of wide personal experience with epidemic diseases, and men who are trained in the art of consultation to render service to health officers in difficulty over matters of diagnosis and the like. It is part of their duty to inspect the workings of health boards in the localities to which they are sent and to offer advice as to organization, procedure, etc.

Diphtheria:

The statistics for the year show an increase in the mortality from diphtheria of about 100. During the last months of the year the individual diphtheria reports show a freer and more thorough use of antitoxin, both for purposes of prevention and cure.

Scarlet Fever:

Scarlet fever has been excessive during the closing months of 1907, due to the severity of the type of disease, its special contagiousness and lack of power to control the disease through quarantine methods.

Typhoid Fever:

New interest in the causation and diffusion of typhoid fever has been awakened during 1907 by the discovery of chronic carriers of the disease. The matter is one which gives occasion for a new factor to be considered in the investigation of typhoid epidemics. Outbreaks of this disease occurred in Auburn, Elmira, Matteawan, West Seneca, Millsboro, Catskill, Lockport, Walden, Oneonta, Corinth and Whitehall.

Cerebrospinal Meningitis:

This disease has practically disappeared as an epidemic disease during 1907. A small outbreak of acute anterior polio-myelitis appears to have taken its place and in turn subsided in New York city and its vicinity.

Tuberculosis:

The meagre returns of individual reports of a little over 2,000 cases of tuberculosis, outside of New York City, for the year

shows how inadequate the records of that disease in the Department are, and emphasizes the necessity in the coming campaign against tuberculosis for complete compulsory notification and registration.

Measles:

Epidemics of measles are reported to the extent of 12,000 cases individually reported. The sanitary control of epidemics of measles presents very many serious problems. The death rate from measles and from the sequelæ following measles has been very high during the year. A thorough sanitary quarantine or control which would limit the number of cases is very desirable, but very difficult of attainment owing to the extreme communicability of the disease. As a rule the sequences of measles from a sanitary standpoint are not appreciated by the public and add still further to the embarrassment of the authorities who attempt to maintain control of that epidemic. The public need further enlightenment on this point.

Smallpox:

By far the largest part of the energies of this division of the Department have been devoted during 1907 to the fight against smallpox. In the spring a number of cases were reported from the neighborhood of Deposit, in Delaware county, and in the fall serious outbreaks occurred in Jefferson, Oneida and Herkimer counties, and in Ulster county.

In brief it may be said that the epidemic continues to hold sway and is likely to do so through the winter months. Experience has slowly demonstrated the impossibility of the control of mild smallpox through quarantine regulations. Many communities throughout the State have come to recognize this fact and of their own accord have undertaken a systematic public vaccination. It is quite evident that this epidemic of smallpox will continue until a general understanding is reached by the public at large that vaccination is the only certain means of staying the disease.

Malaria:

Epidemics of malarial diseases have been investigated at Stony Point, North Tarrytown and West Haverstraw. Recommendations made for suppression of the disease by drainage and the use of petroleum were not followed by the local authorities at Stony Point. At North Tarrytown a campaign against the mosquito will begin with the early spring, and also at West Haverstraw.

Investigations:

The services of these experts have been called upon during the past year in conducting investigations as follows: Smallpox in over fifty communities; typhoid fever at St. Johnsville, Piercefield, Katonah, Mt. Kisco, Whitehall, Granville, Central Valley and Boonville; scarlet fever at Palmyra, Hartford and Glenville; diphtheria at Waverly, Southampton, Ilion, Norwood, Attica and Throop.

In conjunction with the Division of Publicity and Education, the circulars published by the Department for distribution in households in which there are cases of communicable diseases, have been translated into Italian and distributed to the health officers who have considerable Italian populations in their jurisdiction.

DIVISION OF PUBLICITY AND EDUCATION

The Monthly Bulletin:

The *Monthly Bulletin* of the Department has been issued regularly during the past year, and has formed the chief means of communication between the Department and health officers and others interested in public health work. Besides the statistical tables showing the mortality in the several municipalities of the State, as a whole and attributable to the principal diseases, from twelve to twenty pages of text have been included in each issue. This has furnished opportunity for the early publication of valuable reports of special investigations conducted by the Department in addition to official announcements. Space has also been found to record many interesting and valuable advances in sanitary science and public hygiene as published by workers in this field all over the world.

It is gratifying to know that the *Monthly Bulletin* is one of the most popular institutions of the Department. Health officers and others make frequent reference to it in their correspondence with the Department, and other publications quote from it freely. Upwards of 5,000 copies of each number have been mailed and the list of readers is constantly being increased.

Special Circulars:

There has been a steady demand for the circulars on the principal communicable diseases during the past year, and new editions and revisions of some of them have been called for.

Sanitary Institutes for Health Officers:

Since my last annual report sanitary institutes have been held at Binghamton, Rochester and Albany, and the attendance of health officers at each has been very satisfactory. At Binghamton and Rochester instructions were given on certain phases of the work to be done by health officers. At Albany a laboratory course was given at the State Hygienic and Bender Laboratories.

Annual Conference:

The Seventh Annual Conference of the Sanitary Officers of the State of New York was held in Buffalo on October 16th, 17th and 18th, and was, without question, the best meeting of its kind ever held in this State. Upwards of 1,500 people listened to the Commissioner's address, and even larger audiences, numbering between 2,000 and 3,000 people, were present at the evening public sessions when the subjects of tuberculosis and pure milk were discussed. The speakers and the subjects of their addresses were as follows:

Hon. J. N. Adam, Mayor of Buffalo — Address of Welcome.

Hon. Wm. H. Gratwick, President of Chamber of Commerce — Address of Welcome.

Prof. V. A. Moore — The Dissemination and Control of Tuberculosis as Illustrated by the Bovine Species.

Dr. John H. Pryor — Early Diagnosis and Treatment of Tuberculosis.

Dr. Edward Devine — The Duty of the Municipality toward the Tuberculous.

Adna F. Weber, Ph.D.— Labor Legislation in its Relation to Public Health.

Theodore Horton — Sewage Disposal for Institutions and Small Communities.

A. H. Seymour — The Laws Relating to the Pollution of Streams.

L. M. Wachter — Sanitary Inspection of Wells and their Surroundings.

Dr. John T. Wheeler — Practical Points on Quarantine.

Dr. H. E. Schmid — Detection of Communicable Diseases.

Dr. Harlan P. Cole — Presence of Physical Defects in School Children.

Dr. Herbert D. Schenck — Detection of Defects of the Eye, Ear, Nose and Throat of School Children.

Dr. Thomas Darlington — Pure Milk by the Inspection of Dairies and Farms.

Dr. Ernest Wende — Pure Milk by the Permit and License System.

Dr. Henry R. Hopkins — Pure Milk by the "Telltale" Milk Register.

Dr. George W. Goler — Pure Milk by Educational Measures.

Ellis W. Santee, M.D.— Pure Milk by the Use of the Score Card System.

The proceedings of the Conference were well reported in the local newspapers and the press throughout the State devoted some space to the Commissioner's address, which was also reprinted in full by one or two of the leading medical journals of the country. The official report of the Seventh Annual Conference has already been issued.

Tuberculosis Exhibition:

Early in the year a communication was received from Dr. John S. Fulton, Secretary-General of the International Congress on Tuberculosis, requesting the good offices of the Department in the organization of the available forces in the State of New York in the interest of the Congress and especially in the collection and preparation of a suitable exhibition to be sent from this State to the Congress meeting place in Washington. As a communication

had also been sent to Governor Hughes requesting him to support the work of the Congress no definite action was taken by the Department until Governor Hughes signified his willingness to have the Department proceed as far as our appropriations permitted in stimulating the various forces in the State to take action, and in the preparation of a suitable exhibition.

As it then appeared that the exhibition would probably serve a double purpose, that is, for demonstration in this State and also at the International Congress at Washington, it was determined to make the scope and construction of the same such as would render it equally effective for both purposes.

As to its scope it was determined to make it a State exhibition for the purpose of showing what has been and is being done in the State in all aspects of anti-tuberculosis work. To this there was to be added such educational features as seemed advisable to have for use and demonstration during its State travels and which need not of necessity be sent to the Congress at Washington.

A special report on the Exhibition, its construction, contents and management will be found as an Appendix to the report of the Division of Publicity and Education.

The Exhibition was demonstrated for the first time, and most successfully, at the Seventh Annual Conference of Sanitary Officers at Buffalo in October as has been referred to. The Exhibition was also shown during the Ninth Annual State Conference of Charities and Corrections, which was held in the Capitol, Albany, November 12–15th. Here it attracted a great deal of attention and many requests were received for its demonstration in other large cities of the State and plans were made accordingly.

At this time presentations were made by the Hon. Homer Folks, Secretary of the State Charities Aid Association, that a committee on the Prevention of Tuberculosis of his organization had been formed and that funds for its work had been contributed by one of the charitable foundations of New York city and that this committee intended to undertake the statistical study and the field investigation of the disease in various cities in the State and to conduct local campaigns of education directed towards the improvement of the conditions as found. He suggested that the

economy of the method and the greater surety of getting the schools promptly finished. It is the only plan that has been found, after considerable trial, to combine promptness and completeness with a fair degree of accuracy. If the examinations were made by a school inspector they must necessarily be made hurriedly and the results would be no more accurate than those made by the teacher. And where the village has to depend upon one physician to do this work he will hardly get around during the school year. The teachers have the confidence of their pupils, and the latter are less liable to become nervous and make blunders by incorrectly naming the letters in cases where the vision is perfect.

Reports were sent to the parents where there was defective vision or hearing or the child had inflamed or scaly lids or suffered from headache, especially if with any of these symptoms he did not get along in school as well as his fellow students. Those where there was any discharge of an offensive odor from the ears and those who were mouth-breathers were also reported.

Only those of seven years and over had their vision examined, but all those in the public school had their hearing tested and determination was made whether any of them were mouth-breathers or had any obstruction of the throat or nose.

The total number of children examined was 89,640.*

Of these 43,658 had defective vision, which was about 48.7 per cent. of the whole.

Those reported as having inflamed eyes or scaly lids were 10,126. Those who had headache numbered 17,803.

The total number reported with defective hearing was 5,727.

Those having a discharge from the ear or earache were 5,810.

The mouth-breathers were reported as numbering 10,831.

The reports sent to the parents amounted to 4,814.

This compares favorably with the reports of these examinations in other States and cities, which, especially the test for vision, has been in vogue for many years.

We are indebted to the Department of Education for furnishing us with the list of the trustees and presidents of the boards of edu-

* These figures were estimated when returns were incomplete. The complete report will be found in this volume.

cation in the various villages, and to the health officers of some of the villages for their co-operation in making the examinations a success.

The results seem to be exceedingly good for a new step in a matter of this kind, which was bound to meet with a large amount of opposition upon the part of those who were uninformed or opposed to any advances or changes in their educational methods. This plan, however, has had the cordial approval not only of every physician who has given it any thought, but has been favorably commented upon by the society which is trying to improve the physical welfare of school children, and it has been the means of stimulating more active work in some of our large cities where inspectors have been very lax recently in paying attention to the vision.

The present noncompulsory plan has been more successful than we anticipated, but while that is a matter for congratulation so far as this work in the villages is concerned, it seems doubtful whether it would be possible to make it a success in the country districts where there is only a single teacher and a trustee who is either opposed to the tests because he knows nothing of their value or takes no interest in seeing the work done.

Connecticut, Vermont and Massachusetts have all deemed it wise to pass laws making this examination in their schools compulsory, while Illinois and some States of the middle west depend upon the voluntary co-operation of their teachers in making this examination. It would seem, however, whether it remains voluntary or becomes compulsory, that its success will be greatly enhanced if the men who are conducting teachers' institutes in the Department of Education devote half an hour or an hour to an exposition of the necessity for such an examination in enhancing the physical welfare of the children, and also in explaining in detail the method of conducting the examination as well as tabulating the results in order that the teachers may be familiar with the matter when they come to make the tests.

With the great power that is lodged in the Department of Education in this State, it would seem that the making of this matter

compulsory would be justified and aid greatly in having the examination more widely adopted than it is at the present time.

Another matter that has received considerable attention in this Department has been the matter of ophthalmia neonatorum, which the census of the blind of this State, recently completed under the direction of the New York Commission for the Blind, shows is causing about 30 per cent. of those who have lost their sight. This is an entirely unnecessary form of blindness, and due to carelessness or ignorance. The vigorous work that has been pushed in bringing this matter to the attention of the medical profession and the public in the last year, has resulted in getting the physicians stirred into active work for suppressing this misfortune, which befalls such a large proportion of our babies.

Ophthalmia neonatorum was put some time ago upon the list of contagious diseases by the Department. A campaign of education regarding this matter must be undertaken, and leaflets and pamphlets distributed by settlement workers in our large cities as well as in a public way to the mothers in our rural communities through the Farmers' Institute and other means.

THE DIVISION OF VITAL STATISTICS

During the year 1907 there were reported to the State Department of Health 195,735 births, 147,890 deaths and 94,456 marriages.

Based upon an estimated population of 8,425,333, the birth rate per 1,000 population was 23.2, showing a satisfactory increase over the rate for 1906 (22.2).

The city birth rate was 6.1. Dunkirk again leads, having the highest birth rate, 34.2. Other cities having a birth rate above 25 are: Greater New York, 28.2; Schenectady, 27.6; North Tonawanda, 27.9; New Rochelle, 26.1.

The cities reporting fewer births than deaths are Albany, Cohoes, Elmira, Hudson, Ithaca, Johnstown, Newburgh, Troy and Watervliet.

Albany reports 618 more deaths than births; Cohoes, 56; Elmira, 13; Hudson, 21; Ithaca, 12; Johnstown, 3; Newburgh, 58; Troy, 626, and Watervliet, 33.

The rural birth rate was 15.8, and the death rate, 16.1.

Summary of Mortality for 1907:

The death rate per 1,000 of population in the State was 17.5. In 1906 it was 17.1, and the average for five years past was 17.2.

Deaths under 1 year were 8,011; from 1 to 5 years, 12,157; from 5 to 10 years, 3,260; from 10 to 20 years, 5,220; from 20 to 40 years, 24,901; from 40 to 60 years, 29,583; from 60 to 80 years, 34,668; and over 80 years, 9,924. Of males, 80,156 died; females, 67,702.

Typhoid fever deaths were increased by 105 over those of last year, and by 122 over the 5 year's average. To the total of 1,673 should probably be added most if not all of the 136 deaths attributed to malarial diseases, which is an unusual cause of death.

There were 10 deaths from smallpox.

The mortality from measles was decreased from a 5 years' average of 1,035, and the total of 1906 of 1,369 to 997 in 1907. Scarlet fever, on the other hand, was a greater mortality factor, the total in 1907 being 1,032, while in 1906 it was only 690, and the 5 years' average was 976.

There is a gain of about 100 in the deaths from diphtheria over those of last year, 2,603 deaths due to this cause. The 5 years' average was 2,784.

There were 2,386 deaths from influenza and 483 from erysipelas.

Only 230 deaths from cerebrospinal meningitis were reported; the year before the total was 1,178.

Pulmonary tuberculosis caused 14,431 deaths in 1907, 404 more than in 1906, and 827 more than the 5 years' average. Tuberculosis of other organs added 2,164 deaths.

Deaths from cancer also show an increase from a 5 years' average of 5,673, and 1906's total of 6,168 to 6,420 in 1907.

There were 14,539 attributed to diseases of the nervous system and 16,952 to diseases of the circulatory system, an increase over 1906 of 1,018 and 1,557 respectively.

Deaths classified as due to pneumonia dropped to 11,014 from the total of 15,333 for 1906. On the other hand, other respiratory diseases added greatly to the mortality. In 1906 deaths

from this cause were put at 4,663; while in 1907 they were 11,649.

Diarrhea and enteritis in infants under 2 years of age caused 9,213 deaths, an increase of 882 over the 5 years' average.

Bright's disease also increased its figures from 1906's total of 8,984 to 9,244.

Diseases of the skin showed an increased mortality, raising a total of 379 for 1906 to 701.

There was also a very large increase in the malformations responsible for death, from 497 in 1906 to 1,138 in 1907; and deaths under 3 monthe increased from 4,606 in 1906 to 7,025 in 1907.

Deaths from violence or external causes numbered 9,625 as against 8,874 last year. Included in this total are suicides, 1,207; fractures, 659; burns and scalds, 738; heat and sunstroke, 92; exposure to cold, 45; electric shock, 85; drowning, 967; poisonous gases, 506; accidental poisoning, 293; accidental gunshot wounds, 120; railroad injuries, 1,425; injuries by machinery and in mines and quarries, 207; homicides, 382.

City Death Rate:

The city death rate was 18.1. Cohoes has the highest resident death rate, 21.1, while Poughkeepsie is a close second with a death rate of 20.3.

Other cities having a higher death rate than Greater New York, 18.5, are Newburgh, Rome, and Utica.

Compared with 1906, seventeen cities show a higher death rate for 1907, eight of which, however, have a death rate lower than the average death rate, 16.3.

Jamestown has the lowest death rate, 11.36; and the following cities show a death rate under 14: Cortland, Fulton, Geneva, Hornell, North Tonawanda, Olean, Plattsburg, Tonawanda.

Compared with 1906, the following cities show a decrease in death rate in 1907: Albany, Amsterdam, Auburn, Binghamton, Cortland, Dunkirk, Fulton, Geneva, Hornell, Hudson, Middletown, Mt. Vernon, New Rochelle, North Tonawanda, Ogdens-

burg, Olean, Oneida, Oswego, Rensselaer, Rome, Utica, and Yonkers.

The following cities had a lower resident death rate during 1907 than the average rate for the previous five years: Albany, Amsterdam, Cortland, Dunkirk, Fulton, Geneva, Hornell, Hudson, Ithaca, Jamestown, Middletown, New Rochelle, North Tonawanda, Ogdensburg, Oswego, Plattsburg, Rensselaer, Rome, and Yonkers.

The average death rate in the State institutions is slightly on the increase. In 1905 it was 5.56; 1906 and 1907, 6.88 per 100 inmates.

Compared with the average rate for the past five years, fifteen institutions show an increase and ten a decrease. The largest decrease is shown in the Long Island State Hospital.

It is evident from what has been said that the work of the Department is proceeding along many and varied important lines. Some are already practically completed, others require but little further effort, but the great majority must be followed with persistence and patient energy for a long time yet to come.

Very respectfully,

EUGENE H. PORTER,

February 15, 1908 *Commissioner of Health*

APPENDIX

TWENTY-EIGHTH ANNUAL REPORT

OF THE

STATE DEPARTMENT OF HEALTH

FINANCIAL STATEMENT

Fiscal Year 1906–1907

		Salaries
Employees:		
Eugene H. Porter, M.D., Commissioner:		
Salary	$3,500 00	
Expenses	1,224 61	
		$4,724 61
Alec H. Seymour, secretary		2,500 00
Fenimore D. Beagle, chief clerk and registrar		2,400 00
John T. Wheeler, M.D., medical expert on contagious diseases		375 00
Edwin H. Wolcott, M.D., medical expert on contagious diseases		1,000 00
Edward C. Kenny, stenographer		950 00
*Frank J. Sanborn, stenographer		565 53
Marion L. Peters, stenographer		185 00
Charles E. Thompson, clerk		1,500 00
A. K. Cole, clerk		1,500 00
William A. Wallace, clerk		1,500 00
Jeremiah Grogan, Jr., clerk		1,162 50
Cora B. Partridge, clerk		900 00
Elizabeth E. Staley, clerk		600 00
John G. Hines, clerk		747 50
Ella H. Porter, clerk		720 00
Rae Samuels, clerk		61 30
Anna B. Byrne, clerk		245 00
Meta E. Mills, junior clerk		599 03
Harry Crotty, page		336 73
*D. C. Corwin, draughtsman		75 00
		$22,647 20

* Late and temporary employees.

Antitoxin Laboratory

	Salaries.
Herbert D. Pease, M.D., director	$3,000 00
Mott C. Cunningham, assistant bacteriologist	375 00
Ida H. Lindsay, clerk	1,200 00
Marie A. Dowling, assistant bacteriologist	540 00
Grace McCullom, stenographer	590 00
Charles Schadler, stableman	600 00
Walter Reynolds, assistant stableman	435 00
Mrs. Fannie Mainster, cleaner	288 33
Blanch C. Vose, cleaner	435 00
Mrs. J. Cruickshank, cleaner	435 00
Mrs. Charles Schadler, cleaner	33 00
	$7,931 33

Disbursements

Oct.,	1906.	Salaries	$605 00	
		Sundries	689 28	
				$1,294 28
Nov.,	1906.	Salaries	$623 33	
		Sundries	368 62	
				991 95
Dec.,	1906.	Salaries	$640 00	
		Sundries	433 59	
				1,073 59
Jan.,	1907.	Salaries	$640 00	
		Sundries	299 10	
				939 10
Feb.,	1907.	Salaries	$640 00	
		Sundries	1,179 35	
				1,819 35
March,	1907.	Salaries	$640 00	
		Sundries	240 91	
				880 91
April,	1907.	Salaries	$640 00	
		Sundries	371 06	
				1,011 06
May,	1907.	Salaries	$640 00	
		Sundries	301 24	
				941 24

June,	1907.	Salaries	$640 00	
		Sundries	552 96	
				$1,192 96
July,	1907.	Salaries	$730 00	
		Sundries	300 96	
				1,030 96
Aug.,	1907.	Salaries	$746 50	
				746 50
Sept.,	1907.	Salaries	$746 50	
		Sundries	1,331 59	
				2,078 09
				$13,999 99

Cancer Laboratory

H. R. Gaylord, M.D., director	$2,500 00
G. H. A. Clowes, M.D., chemist	2,500 00
Gary N. Calkins, biologist	1,200 00
F. W. Baeslack, assistant biologist	1,200 00
C. A. Maclay, secretary	900 00
D. Averill, photo chemist	900 00
B. T. Simpson, microscopist	76 80
F. A. Payne, janitor	360 00
E. Kempes, laborer	315 00
M. Weber, laborer	348 00
*Edward Schreiner, laborer	125 28
Jessie McCarney, laborer	156 88
*Leo Weigand, laborer	61 33
John Schweinshaut, laborer	450 00
*Alfred M. Kirsch, laborer	52 50
Charles Petritz, laborer	17 50
*John Mumm, laborer	36 00
*Clarence Witt, laborer	24 00
*George A. Keim, laborer	42 00
*Harry Blystone, laborer	62 37
	$11,327 66

* Late employees.

Disbursements

Oct.,	1906.	Salaries.		$893 49
Nov.,	1906.	Salaries.		892 16
Dec.,	1906.	Salaries.	$911 03	
		Sundries.	1,019 79	
				1,930 82
Jan.,	1907.	Salaries.	$901 41	
		Sundries.	440 66	
				1,342 07
Feb.,	1907.	Salaries.	$931 41	
		Sundries.	728 98	
				1,660 39
March,	1907.	Salaries.	$985 82	
		Sundries.	512 66	
				1,498 48
April,	1907.	Salaries.	$977 66	
		Sundries.	470 27	
				1,447 93
May,	1907.	Salaries.	$983 06	
		Sundries.	481 30	
				1,464 36
June,	1907.	Salaries.	$963 66	
		Sundries	408 41	
				1,372 07
July,	1907.	Salaries.	$960 66	
		Sundries.	569 68	
				1,530 34
Aug.,	1907.	Salaries	. . . . .	972 06
Sept.,	1907.	Salaries.	$955 24	
		Sundries.	638 07	
				1,593 31
				$16,597 48

Hygienic Laboratory

Leonard M. Wachter, chemist.	$1,500 00
Mott C. Cunningham, bacteriologist.	1,062 50
W. G. Fellows, assistant bacteriologist.	180 00

Prof. Willis G. Tucker, chemist	$170 00
Gick & Sayles, building addition to laboratory	2,406 34
Bender Laboratory, bacteriological work	1,350 00
Sundries	349 44
	$7,018 28

Consulting Engineers

Theodore Horton, consulting engineer	$3,000 00
H. B. Cleveland, assistant sanitary engineer	1,775 00
Henry N. Ogden, assistant sanitary engineer	1,490 00
Printing	17 00
	$6,282 00

Office Expenses

Supplies furnished local boards of health, furniture, books, printing and other office expenses.

October, 1906	$894 71
November, 1906	1,107 75
December, 1906	946 08
January, 1907	494 89
February, 1907	717 81
March, 1907	336 88
April, 1907	2 00
*May, 1907	.....
*June, 1907	.....
July, 1907	2,089 29
August, 1907	515 22
September, 1907	1,384 48
	$8,489 11

* Bills included with those of July.

Disbursements

Printing, office stationery and supplies furnished local boards of health	$4,270 19
Furniture	742 83
Books	232 07
Telephone service	562 93
Telegraph and messenger service	189 25
Office supplies and other expenses	2,491 84
	$8,489 11
Postage and expressage	$4,012 35

Investigations

Annual conference of sanitary officers	$1,150 28
Expenses of investigations as follows:	
Olin H. Landreth, consulting engineer	150 00
Theodore Horton, consulting engineer	104 26
Dr. H. D. Pease, director of laboratory	65 02
Holmes C. Jackson, chemist	769 00
Dr. F. C. Curtis, medical expert	82 50
Dr. J. T. Wheeler, medical expert	60 00
Dr. L. B. Couch, medical expert	45 00
Dr. Wallace Clark, medical expert	179 33
Dr. H. D. Schenck, medical expert	50 00
Charles Schadler	5 11
F. D. Beagle	9 20
Jeremiah Grogan, Jr.	30 98
Charles Walker, sanitary inspector	213 22
Dr. J. H. Meehan, sanitary inspector	270 00
John H. Vogt, sanitary inspector	416 87
C. H. Brewer, sanitary inspector	234 20
Lee J. Vance, sanitary inspector	149 25
L. H. Whitney, sanitary inspector	275 56
Leigh Robartes, sanitary inspector	148 90
John R. Taylor, sanitary inspector	195 41
Francis J. Seary, sanitary inspector	189 17

J. Birkhahn, sanitary inspector	$160 42
A. B. Cudebec, sanitary inspector	140 94
Printing	800 37
Hearings	30 94
Supplies	115 81
	$6,041 74

Sewage Disposal Examinations, Etc.

Supplies for laboratory	$1,000 68
Leonard M. Wachter, chemist	150 00
A. J. Slack, assistant chemist	660 00
C. R. Parmenter, labor	56 00
Expressage	9 04
Printing	3 78
Sanitary institutes	969 04
	$2,848 54

Smallpox and Other Epidemics

Dr. Hills Cole, medical expert	$840 00
Dr. S. A. Knopf, essay on tuberculosis	500 00
Dr. F. C. Curtis, medical expert	166 80
Dr. Wallace Clark, medical expert	158 56
Dr. E. H. Wolcott, medical expert	59 31
Dr. W. H. Connelly, medical expert	46 00
Dr. O. W. Peck, medical expert	40 00
Dr. J. T. Wheeler, medical expert	33 80
Dr. D. M. Hibbard, medical expert	31 80
Dr. A. D. Lake, medical expert	50 30
Dr. A. G. Wilding, medical expert	17 40
Dr. L. B. Couch, medical expert	11 00
Printing	1,667 58
Supplies	8 50
	$3,631 05

Traveling Expenses

Expenses incurred by subordinates in making investigations, etc.:

October, 1906	$127 27
November, 1906	493 30
December, 1906	456 85
January, 1907	479 41
February, 1907	379 65
March, 1907	463 28
April, 1907	336 95
May, 1907	454 36
*June, 1907.	.....
July, 1907	944 43
August, 1907	249 05
September, 1907	302 96
	$4,687 51
Tuberculosis exhibition	$11 45

* Bills included with those of July.

DIVISION

OF

VITAL STATISTICS

DIVISION OF VITAL STATISTICS

Hon. EUGENE H. PORTER, M. D., *State Commissioner of Health, Albany, N. Y.:*

SIR:— I have the honor to transmit the following report covering the work in the Division of Vital Statistics for the year 1907.

Condition of Work

The condition of the work in the Division at the close of the year is very satisfactory, but the additional work devolving upon the Department in carrying out the provisions of the new marriage license law, and the important investigations now under way, make it necessary that the clerical force of the Division should be increased as soon as possible, if the Division is to be kept up to its present state of efficiency.

The number of local boards of health in the State under the jurisdiction of the State Department of Health is 1,418, an increase of three over the previous year.

The Department has kept in close touch with the local boards during the year, providing them with the necessary registration blanks, and rendering such assistance as was possible to bring about a more complete registration of vital statistics.

Certificates Filed with the Department

The certificates filed with the Department during the year from the registration districts in the State (outside of the cities of Albany, Buffalo, Greater New York and Yonkers) under the direct supervision of the Department, were as follows:

MONTH.	Births.	Deaths.	Marriages.	Total.
January	4,739	5,455	2,457	12,651
February	4,681	5,654	2,222	12,557
March	5,499	5,730	1,921	13,150
April	5,231	5,020	2,370	12,621
May	5,435	4,818	2,118	12,371
June	4,948	4,195	3,804	12,947
July	5,492	4,170	2,785	12,447
August	5,582	5,229	2,674	13,485
September	5,564	4,918	3,209	13,691
October	6,147	4,745	3,278	14,170
November	5,888	4,531	3,204	13,623
December	7,115	4,791	5,272	17,178
Total	66,321	59,256	35,314	160,891

Total Registration in the State

The State is divided into 1,422 registration districts — 932 towns, 445 incorporated villages and 45 cities.

The total registration of births, deaths and marriages in the State during the year 1907, is shown by the following table:

MONTH.	Births.	Deaths.	Marriages.
January	16,196	13,648	9,405
February	14,578	13,118	6,856
March	15,803	13,801	5,034
April	16,103	12,474	7,881
May	15,942	11,927	6,151
June	14,943	10,929	10,432
July	16,611	11,976	7,128
August	17,649	13,465	6,910
September	16,710	11,527	7,903
October	17,291	11,400	8,550
November	15,945	10,779	8,331
December	18,249	12,733	10,635
Total	196,020	147,777	95,216

For the first time in the history of the Department, the month of December leads in marriages. This was no doubt due to the fact that many wished to avoid the embarrassment of procuring a marriage license, as required by the new marriage law which took effect January 1, 1908.

Estimating the population of the State to be 8,425,333, the birth rate is shown to be 23.2, and the death rate 17.5 per 1,000 population. The birth rate for 1906 was 22.2 and the death rate 17.1.

Improvement in the Registration

The earnest efforts of the Department to bring about a more complete registration of vital statistics in the State, have resulted in local registrars filing their monthly returns with the Department more promptly than during previous years, and the increased registration, due in many instances to the filing of delayed returns, is evidence of a marked improvement in the registration.

During the year it was necessary to serve notices upon thirty-two local boards of health to correct known defects in the registration, and in only one instance was it necessary for the Department to send a representative to take charge of the local registration — Massena, St. Lawrence county.

Registration of Births

The registration of births is still unsatisfactory, but as the new marriage license law will relieve the Department of efforts formerly required to bring about complete registration of marriages, the Department will be left free to concentrate its efforts upon the proper registration of births, and I anticipate that the coming year will see a great improvement in this respect.

It is surprising to see the lack of interest taken in this important matter in all states.

In 1900 the registration of births in the United States was not considered complete enough in any of the states for statistical purposes, and at present the United States Census Bureau considers the registration in but seven states, and the District of Columbia, as being probably within 90 per cent. of the correct figures viz.: Rhode Island, Massachusetts, Connecticut, New Hampshire, Pennsylvania, Michigan and Indiana.

Owing to the frequent changes made in the local registration officials, it seems almost impossible for the Department to make any decided headway in bringing about the complete registration of births.

If the local boards of health would enforce the provisions of section 22 of the Public Health Law the registration would be complete.

The law should be amended so as to require attending physicians, or the parents of children, to file certificates of births within ten days, instead of thirty days, after the birth of a child

Registration of Marriages

While there has been an improvement in the registration of marriages during the past year, it is well known that the registration in the past has been far from being complete, but the new marriage license law will correct existing defects and result in the complete registration of marriages occurring in the State in the future.

The new law requires copies of certificates of all marriages occurring in the State to be filed with the Department, and this will add about 60,000 certificates annually to the records of the

Department, the cities of Albany, Buffalo, Greater New York and Yonkers having heretofore retained such records.

Marriage Law Should be Amended

It seems advisable that the new marriage law should be amended so as to provide for the filing of the original certificates with the Department, instead of copies as now required. This would provide for the safe keeping of these valuable records in the fireproof steel filing cases in the Capitol, and complete the Department files of original records.

It would also save the State one-half of the expense incurred in furnishing the blank records necessary to make duplicate copies to be filed with the Department, and also save the counties the necessary expense of providing fire-proof filing cases for the original certificates and the clerical force necessary to make duplicate copies of the records.

Inasmuch as all records of births, marriages and deaths occurring in Greater New York have heretofore been kept on file in the central office of the city department of health, no inconvenience would be caused this Department should the original certificates of marriages be retained by the city authorities, and by so doing the city would be relieved of the necessary expense and labor of providing the State with duplicate copies.

Registration of Deaths

That the registration of deaths is nearly complete is accepted as a fact, but the certificates are not filed as promptly as they should be after the date of death.

This is owing in many instances to the fact that local boards of health designate persons other than the registrar of vital statistics to issue burial permits, and certificates filed with those persons are slow in reaching the hands of the registrar.

Section 23 of the Public Health Law should be amended so as to provide that only the registrar of vital statistics should be authorized to issue burial permits.

This would insure the prompt filing of death certificates with that officer and prevent the acceptance of many defective certificates which have to be returned by the Department for correction.

Defective Certificates

During the year the Department was obliged to return 5,734 defective certificates for correction.

To obviate this the Department prepared a circular letter of instructions to local registrars pointing out the most common defects, and giving instructions in full covering all points of information that are required to make the records complete, and the registrars were notified not to accept certificates which lacked any information called for on the blanks.

Notwithstanding this precaution, the Department is called upon each month, to return hundreds of certificates for correction, and in most instances it is owing to the fact that the certificates have been filed with some member of the board of health instead of the registrar.

Department Should Have Complete Records Outside of Greater New York

I wish to again recommend for your favorable consideration the advisability of having the registration laws so amended as to require the filing with the State Department of Health of certificates of births and deaths occurring in the cities of Albany, Buffalo and Yonkers, thus giving the Department complete records of the State outside of the city of Greater New York.

The authorities of the city of Albany expressed their willingness last winter to file the original certificates with the Department, and it was owing to the attitude taken by the officials of Yonkers that the bill introduced in the Legislature last winter making this amendment to the Public Health Law failed of passage.

I have no doubt but what this opposition could be overcome by the introduction in the Legislature of a bill providing, that in lieu of the original certificates, the above named cities shall file copies of the certificates of births and deaths occurring in the cities, for which the city registrar of vital statistics shall receive two cents a copy.

This would not cost the Department $400 a year, and would be money well expended, as it would enable the Department to

keep complete records of births, marriages and deaths occurring in the State outside of the city of Greater New York and make possible a uniform and correct tabulation of statistics.

That the statistics of the State may be comparable and of value for scientific purposes, it is essential that the Department should have as complete records of the State as possible, and that the certificates should be uniform and accurate.

Transcripts

During the year the Department was called upon to furnish 815 certified copies of certificates of births, deaths and marriages, to be used for judicial and administrative purposes.

Age and Mortality

The following shows the number of deaths which occurred within each age-period, and the relation which the percentage in each period bears to the whole number of deaths.

		Per cent.
Under 1 year of age	28,011	19.00
From 1 to 5 years of age	12,157	8.20
From 5 to 10 years of age	3,260	2.20
From 10 to 20 years of age	5,220	3.50
From 20 to 40 years of age	24,901	16.80
From 40 to 60 years of age	29,583	20.10
From 60 to 80 years of age	34,668	23.40
Over 80 years of age	9,924	6.69
Ages unknown	166	.11
	147,890	100.00

Sex, Color and Social Relations

The following table gives the total number of deaths occurring during the year, as to sex, color and social relations:

SEX.		Color.		Social relations.	
Males	80,176	White	144,367	Married	50,134
Females	67,702	Negro	3,401	Widows	19,003
Not stated	32	Mongolian	87	Widowers	10,529
		Indian	35	Single	67,881
				Divorced	343
Total	147,890	Total	147,890	Total	147,890

Births

The following is a general summary of the births occurring in the State during the year.

SEX.		Race.			
Males	100,495	White	193,059	Still births	10,261
Females	95,187	Negro	2,625	Premature births	4,907
Not stated	53	Indian	26		
		Mongolian	25		
Total	195,735	Total	195,735		

Death Rate in State Institutions

The following table shows the total deaths occurring in the larger of the State institutions during the year 1907, and the death rate per 100 inmates; also average rate for past five years:

INSTITUTIONS.	Inmates.	Deaths.	1907 death rate.	Average rate past five years.
Auburn State Prison	1,126	10	.89	.96
Binghamton State Hospital	1,591	108	6.78	7.72
*Bloomingdale Asylum	327	25	7.64	6.48
Buffalo State Hospital	1,875	131	6.98	7.92
Clinton Prison	1,052	9	.86	1.04
Craig Colony	1,244	73	5.86	5.16
Dannemora State Hospital	318	9	2.83	2.11
Eastern New York Reformatory, Napanoch	201	1	.49	*.64
Elmira Reformatory	1,238	8	.64	.74
Gowanda State Hospital	904	54	5.97	5.31
Hudson River State Hospital	2,385	206	8.63	8.52
Kings Park State Hospital	3,207	294	9.16	6.82
Long Island State Hospital	716	97	13.54	8.09
Manhattan State Hospital	4,493	439	9.77	9.00
Central Islip Hospital	3,912	297	7.59	6.62
Matteawan State Hospital	696	24	3.44	2.87
Middletown State Hospital	1,331	70	5.25	5.06
New York State Soldiers Home	3,318	214	6.44	7.74
Rochester State Hospital	1,324	117	8.83	11.00
Rome Custodial Asylum	1,013	46	4.54	†4.25
St. Lawrence State Hospital	1,835	166	9.04	7.85
Sing Sing Prison	1,278	6	.46	.67
State Prison for Women, Auburn	84	3	3.56	*2.93
Utica State Hospital	1,224	98	8.00	8.65
Willard State Hospital	2,305	181	7.85	6.16
Total	38,997	2,686	6.88	.....

* Four years. † 1906.

The average death rate in the State institutions is slightly on the increase. In 1905 it was 5.56; 1906, 6.36 and 1907, 6.88 per 100 inmates.

Compared with the average rate the past five years, fifteen institutions show an increase and ten a decrease. The largest increase is shown in the Long Island State Hospital.

City Registration

The following table shows the registration of births, deaths and marriages as reported from the cities in the State; the birth and death rate for the year, and the average rate for the previous five years.

TOTAL REGISTRATION IN CITIES FOR 1907.

CITY.	Estimated population 1907.	Births.	Deaths.	Marriages.	RATE PER 1,000 POPULATION.			
					1907.		AVERAGE FOR PAST FIVE YEARS.	
					Birth.	Death.	Birth.	Death.
Albany	99,984	1,282	*1,900	831	12.8	19.0	12.2	17.8
Amsterdam	25,301	562	420	294	22.5	16.8	20.0	17.1
Auburn	31,760	671	531	442	21.1	16.7	17.9	15.5
Binghamton	42,970	851	673	1,138	19.8	15.7	14.6	15.5
Buffalo	387,096	8,891	¶6,413	4,572	23.0	16.6	20.5	15.4
Cohoes	24,253	454	510	234	18.9	21.1	18.5	19.5
Corning	14,540	273	268	204	19.0	18.6	17.0	15.6
Cortland	12,230	208	155	100	17.3	12.9	15.1	14.3
Dunkirk	16,770	571	265	235	34.2	15.9	34.2	17.4
Elmira	34,184	551	564	714	16.1	16.5	14.6	14.7
Fulton	10,488	186	116	75	17.7	9.9	17.8	15.1
Geneva	12,959	250	179	148	19.4	13.9	19.2	16.0
Gloversville	18,780	310	309	210	16.5	16.4	16.1	14.0
Hornell	13,800	240	184	169	17.4	13.2	18.6	15.0
Hudson	10,566	177	198	98	16.8	18.8	17.4	19.8
Ithaca	15,179	230	242	180	15.3	16.1	14.2	16.5
Jamestown	27,505	568	310	888	20.7	11.3	19.9	12.3
Johnstown	9,690	146	149	105	15.1	15.4	16.7	13.5
Kingston	25,957	523	478	290	20.2	18.5	21.4	17.9
Little Falls	11,447	240	180	101	21.1	15.8	16.1	11.7
Lockport	17,970	315	274	175	17.6	15.3	19.8	15.4
Middletown	14,466	238	240	168	16.5	16.7	14.5	16.4
Mount Vernon	26,729	635	399	545	23.8	14.9	27.0	15.1
Newburgh	27,001	482	530	322	17.9	19.6	18.5	19.6
New Rochelle	23,321	608	338	242	26.1	14.2	26.1	15.8
New York (Greater)	4,278,526	120,716	†79,205	51,097	28.2	18.5	25.5	18.7
By Boroughs:								
Manhattan	2,230,367	65,771	41,319	33,829	29.5	18.4	.....	.....
Bronx	306,210	8,487	6,379	2,268	27.7	20.7	.....	.....
Brooklyn	1,446,690	38,632	26,043	12,916	26.7	17.9	.....	.....
Queens	220,000	5,825	3,857	1,490	26.5	17.4	.....	.....
Richmond	75,259	2,001	1,607	594	26.7	21.4	.....	.....
Niagara Falls	29,809	618	531	563	20.7	17.8	21.8	17.4
North Tonawanda	10,636	295	137	144	27.9	13.0	23.0	13.2
Ogdensburg	13,390	287	264	191	21.4	19.9	20.5	18.4
Olean	10,445	215	138	312	20.7	13.3	19.7	12.8
Oneida	9,298	180	128	66	19.4	13.4	15.8	14.6

Rochester	190,193	4,123	‡2,968	2,216	21.7	15.6	19.4	15.0
Rome	17,100	434	340	112	25.4	20.1	21.3	19.5
Schenectady	70,775	1,954	1,028	713	27.6	14.2	21.6	14.2
Syracuse	121,245	2,367	**1,916	1,045	19.6	15.8	16.5	15.2
Tonawanda	8,118	153	109	89	19.1	13.6	17.7	12.6
Troy	77,575	1,000	§1,626	624	12.9	21.0	11.4	20.4
Utica	65,869	1,527	1,260	476	23.3	19.2	20.8	18.2
Watertown	27,033	538	504	368	20.0	18.7	17.9	16.5
Watervliet	14,679	221	254	67	15.0	17.3	12.1	16.8
Yonkers	68,356	1,473	††1,068	752	21.5	15.4	24.6	17.8

* Including 240 non-residents, making the resident death rate 16.6.
† Including 1,831 non-residents, making the resident death rate 18.2.
‡ Including 157 non-residents, making the resident death rate 14.9.
§ Including 254 non-residents, making the resident death rate 17.7.
¶ Including 458 non-residents, making the resident death rate 15.4.
** Including 179 non-residents, making the resident death rate 14.4.
†† Including 22 non-residents, making the resident death rate 15.6.
‡‡ Including 26 non-residents, making the resident death rate 19.2.
Average city death rate 1907, 16.3.
Average city birth rate 1907, 20.2.

The above table includes deaths of non-residents occurring in the cities, except as indicated by footnotes, and in the following cities, where deaths occurring in State institutions are excluded: Auburn State Prison, Binghamton State Hospital, Elmira Reformatory, Middletown State Hospital, Ogdensburg, St. Lawrence State Hospital, Poughkeepsie, Hudson River State Hospital, Rome State Custodial Asylum, Utica State Hospital.

Note.—Through a typographical error the death rate of New Rochelle for 1906 was given as 10.2, instead of 16.8, the correct rate.

City Birth Rate

The city birth rate is shown to be 26.1.

Dunkirk again leads, having the highest birth rate, 34.2.

Other cities having a birth rate above twenty-five are: Greater New York, 28.2; Schenectady, 27.6; North Tonawanda, 27.9 and New Rochelle, 26.1.

The cities reporting fewer births than deaths are Albany, Cohoes, Elmira, Hudson, Ithaca, Johnstown, Newburgh, Troy and Watervliet.

Albany reports 618 more deaths than births; Cohoes, 56; Elmira, 13; Hudson, 21; Ithaca, 12; Johnstown, 3; Newburgh, 58; Troy, 626, and Watervliet, 33.

The low birth rates shown in Albany (12.8) and Troy (12.9) are undoubtedly due to imperfect registration, physicians failing to file certificates of births attended by them.

The rural birth rate was 15.8 and the death rate 16.1.

City Death Rate

The city death rate is shown to be 18.1. Cohoes has the highest resident death rate, 21.1, while Poughkeepsie is a close second with a death rate of 20.3.

Other cities having a higher death rate than Greater New York (18.5) are Newburgh, Rome and Utica.

Compared with 1906, seventeen cities show a higher death rate for 1907.

Jamestown has the lowest death rate, 11.3; and the following cities show a death rate under fourteen. Cortland, Fulton, Geneva, Hornell, North Tonawanda, Olean, Plattsburg, Tonawanda.

Cities Showing a Decrease in Death Rate

Compared with 1906, the following cities show a decrease in death rate in 1907: Albany, Amsterdam, Auburn, Binghamton, Cortland, Dunkirk, Fulton, Geneva, Hornell, Hudson, Middletown, Mt. Vernon, New Rochelle, North Tonawanda, Ogdensburg, Olean, Oneida, Oswego, Rensselaer, Rome, Utica and Yonkers.

The following cities had a lower resident death rate during 1907, than the average rate for the previous five years: Albany, Amsterdam, Cortland, Dunkirk, Fulton, Geneva, Hornell, Hudson, Ithaca, Jamestown, Middletown, New Rochelle, North Tonawanda, Ogdensburg, Oswego, Plattsburg, Rensselaer, Rome and Yonkers.

Total Registration in the State by Districts

The following tables show the total registration of births, deaths and marriages in the registration districts of the State, by counties.

Albany County

	Population.	Births.		Deaths.		Marriages.	
		1907.	1906.	1907.	1906.	1907.	1906.
Albany, city	98,374	1,282	986	1,900	1,766	831	610
Altamont, village	669	9	7	6	11	6	8
Berne, town	1,915	26	15	20	33	19	17
Bethlehem, town	4,451	37	44	64	54	10	16
Coeymans, town	4,264	83	93	73	54	26	30
Cohoes, city	24,183	480	406	511	466	234	525
Colonie, town	7,845	75	81	145	112	26	25
Green Island, town	.....	.....	.....	.....	.....	.....	.....
Green Island, village	*4,878	82	87	71	85	39	45
Guilderland, town	2,871	25	31	49	36	20	19
Knox, town	1,174	13	7	17	18	8	12
New Scotland, town	2,536	23	26	24	20	14	19
Rensselaerville, town	1,682	25	19	36	32	15	9
Voorheesville, village	479	4	2	5	6	8	7
Watervliet, city	14,600	243	211	257	248	67	85
Westerlo, town	1,558	16	13	28	28	8	9
Total	171,497	2,423	2,028	3,206	2,969	1,331	1,436

* Town and village have same boundaries.

NOTE. — In giving the population of towns including incorporated villages, the town is credited with the inhabitants residing outside of the village limits, as that territory constitutes a separate registration district from the village.

Allegany County

	Population.	Births.		Deaths.		Marriages.	
		1907.	1906.	1907.	1906.	1907.	1906.
Alfred, town	872	18	15	13	9	3	1
Alfred, village	912	9	19	11	12	10	26
Allen, town	631	15	17	3	2	1	5
Alma, town	1,064	22	22	10	7	9	8
Almond, town	1,429	7	16	29	16	9	11
Amity, town	1,130	18	15	17	15	3	.....
Andover, town	882	13	21	8	8	2	3
Andover, village	1,097	4	12	20	17	15	15
Angelica, town	575	3	6	22	16	.....	.....
Angelica, village	1,101	12	13	11	14	11	10
Belfast, town	1,640	10	25	9	19	3	8
Belfast, village	.....	9	.....	11	.....	20	.....
Belmont, village	1,207	13	20	25	12	23	22
Birdsall, town	653	8	7	8	6	3	3
Bolivar, town	938	21	24	12	7	3	1
Bolivar, village	1,368	35	16	13	13	35	25
Burns, town	731	9	13	15	14	4	1
Canaseraga, village	730	8	11	9	10	13	13
Caneadea, town	1,387	22	26	18	25	7	13
Centreville, town	1,029	15	14	12	8	4	5
Clarksville, town	838	7	13	9	9	3	9
Cuba, town	821	12	14	4	9	3	4
Cuba, village	1,519	25	14	29	37	22	21
Friendship, town	978	12	18	15	15	10	4
Friendship, village	1,259	21	15	21	19	16	25
Genesee, town	1,146	16	18	8	13	41	30
Granger, town	761	15	15	17	5	1	2
Grove, town	766	11	8	12	5	6	8
Hume, town	1,817	38	25	36	25	19	17
Independence, town	1,222	23	22	12	11	25	52
New Hudson, town	879	15	15	11	13	2	3
Richburg, village	375	5	11	4	3	8	4
Rushford, town	1,432	25	22	30	17	9	7
Scio, town	1,354	24	20	24	14	8	9
Ward, town	521	9	7	1	1	1	.....
Wellsville, town	1,366	45	48	17	9	9	8
Wellsville, village	4,355	62	84	66	66	86	81
West Almond, town	548	5	5	8	3	.....	2
Willing, town	1,120	14	9	14	11	21	12
Wirt, town	788	15	6	8	2	1	2
Total	43,257	670	701	672	517	469	470

Broome County

	Population.	Births.		Deaths.		Marriages.	
		1907.	1906.	1907.	1906.	1907.	1906.
Barker, town	984	13	15	18	18	1	7
Binghamton, town	703	16	13	8	9	1	3
Binghamton, city	42,036	887	715	674	678	1,138	1,150
Chenango, town	1,314	16	21	22	20	16	8
Colesville, town	2,457	22	30	48	38	23	23
Conklin, town	935	11	12	14	8	11	7
Deposit, village	2,136	40	28	38	51	31	33
Dickinson, town	277	10	8	34	26	.....	.....
Fenton, town	1,145	16	16	16	21	10	8
Kirkwood, town	887	12	4	18	8	14	12
Lestershire, village	4,035	81	68	60	64	49	66
Lisle, town	1,173	32	20	15	17	2	6
Lisle, village	378	5	2	2	2	8	9
Maine, town	1,411	11	10	18	20	9	13
Nanticoke, town	621	6	10	11	3	1	2
Port Dickinson, village	426	7	9	8	1	4	6
Sanford, town	1,288	24	25	20	27	13	20
Triangle, town	884	16	10	11	20	3	3
Union, town	2,657	24	51	30	41	3	10
Union, village	1,454	25	29	21	24	40	42
Vestal, town	1,681	19	21	35	23	14	9
Whitney's Point, village	749	6	10	7	12	19	10
Windsor, town	1,943	35	20	25	29	5	7
Windsor, village	691	14	6	9	8	46	60
Total	72,282	1,348	1,153	1,162	1,168	1,461	1,514

Cattaraugus County

	Population.	Births.		Deaths.		Marriages.	
		1907.	1906.	1907.	1906.	1907.	1906.
Allegany, town	2,224	46	40	25	28	17	9
Allegany, village	1,330	28	22	23	17	15	17
Ashford, town	1,567	41	25	31	3	14	10
Carrollton, town	879	3	4	3	6	1	1
Cattaraugus, village	1,184	26	20	15	15	22	17
Cold Spring, town	713	12	7	7	10	5	4
Conewango, town	1,162	17	8	7	11	4	5
Dayton, town	1,754	23	37	23	18	16	21
East Otto, town	1,111	24	15	12	14	2	8
East Randolph, village	644	5	3	21	19	2	5
Elko, town	324	9	7	6	10	.....	1
Ellicottville, town	1,071	21	19	11	19	7	3
Ellicottville, village	1,044	24	15	18	13	8	16
Farmersville, town	1,014	14	17	10	14	8	8
Franklinville, town	1,025	13	23	16	12	2	11
Franklinville, village	1,485	12	19	20	20	28	10
Freedom, town	1,229	15	13	16	14	5	5
Gowanda, village	*2,063	34	45	14	23	25	19
Great Valley, town	2,167	32	21	28	20	15	6
Hinsdale, town	1,152	24	17	13	23	7	8
Humphrey, town	680	15	3	7	10	1	1
Ischua, town	811	22	17	6	7	6	8
Leon, town	845	12	11	12	10	6	2
Limestone, village	721	11	23	4	2	131	159
Little Valley, town	497	5	3	4	8	3	1
Little Valley, village	1,225	34	15	16	15	19	19
Lyndon, town	647	6	13	6	3	3	1
Machias, town	1,494	20	19	33	31	8	11
Mansfield, town	940	22	16	15	6	3	1
Napoli, town	791	17	19	12	10	5	1
New Albion, town	863	16	14	8	15	6	2
North Olean, village	1,761	48	47	19	17	.....	.....
Olean, town	3,380	89	71	49	45	50	62
Olean, city	10,163	215	211	139	143	312	337
Otto, town	927	19	13	15	11	13	10
Perrysburg, town	1,049	10	10	15	16	5	5
Persia, town	1,858	7	1	8	3	1	1
Portville, town	1,624	23	29	22	17	7	9
Portville, village	774	16	16	11	8	39	52
Randolph, town	539	18	6	16	6	4	7
Randolph, village	1,163	17	13	16	22	22	14
Red House, town	564	17	9	12	3	1	3
Salamanca, town	415	1	.....	7	3	2	1
Salamanca, village	5,455	143	129	100	68	151	104
South Valley, town	562	11	15	3	7	6	3
West Salamanca, village	558	8	8	8	6	5	15
Yorkshire, town	1,730	23	14	27	28	9	7
Total	66,196	1,268	1,122	909	829	1,021	1,020

Cayuga County

	Population.	Births.		Deaths.		Marriages.	
		1907.	1906.	1907.	1906.	1907.	1906.
Auburn, city	31,422	696	638	532	543	442	360
Aurelius, town	1,148	4	22	12	15	5	4
Brutus, town	993	12	11	14	20	2	5
Cato, town	1,160	24	12	24	13	2	9
Cato, village	357	1	3	5	1	4	1
Cayuga, village	400	6	9	3	6	4	2
Conquest, town	1,187	13	7	22	19	5	2
Fair Haven, village	660	12	14	10	14	4	8
Fleming, town	1,006	21	21	16	16	4	
Genoa, town	1,866	7	15	22	20	15	
Ira, town	1,230	22	16	25	15	5	
Ledyard, town	1,996	25	25	23	29	10	
Locke, town	914	8	13	15	17	9	
Mentz, town	869	4	17	13	20	3	
Meridian, village	314	6	2	8	8	8	

* Part of village in Erie county.

[illegible] County—Continued

	Population.	Births. 1907.	Births. 1906.	Deaths. 1907.	Deaths. 1906.	Marriages. 1907.	Marriages. 1906.
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	9
[illegible]	[illegible]	[illegible]	4	[illegible]	[illegible]	[illegible]	2
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	21
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	7
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.....
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	11
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	10
[illegible]	[illegible]	4	[illegible]	[illegible]	[illegible]	[illegible]	8
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	15
[illegible]	[illegible]	[illegible]	4	4	[illegible]	[illegible]	4
[illegible]	[illegible]	[illegible]	4	[illegible]	[illegible]	[illegible]	5
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	9
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	10
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	30	[illegible]	17
Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	632	554

Chautauqua County

	Population.	Births. 1907.	Births. 1906.	Deaths. 1907.	Deaths. 1906.	Marriages. 1907.	Marriages. 1906.
Arkwright, town	663	11	5	6	9	8	3
Brocton, village	1,056	25	20	14	11	90	14
Busti, town	1,534	30	23	17	17	16	18
Carroll, town	1,635	34	34	19	24	60	46
Cassadaga, village	700	15	17	7	10	9	9
Charlotte, town	684	16	9	6	4	2	4
Chautauqua, town	3,505	25	22	63	65	7	11
Chautauqua Lake Assembly, [illegible] village	*	3	3	10	5	4	3
Cherry Creek, town	807	15	21	14	10	6	3
Cherry Creek, village	644	10	4	13	6	12	13
Clymer, town	1,180	23	18	15	12	48	66
Dunkirk, town	438	10	18	11	9	.....	1
Dunkirk, city	15,255	559	577	254	246	235	232
Ellery, town	1,638	36	30	24	19	13	13
Ellicott, town	1,561	21	14	18	19	5	10
Ellington, town	1,264	21	12	17	22	3	9
Falconer, village	1,643	38	39	18	27	28	27
Forestville, village	680	15	3	11	9	13	8
Fredonia, village	5,148	130	135	83	69	76	92
French Creek, town	951	3	4	12	14	18	12
Gerry, town	1,146	17	18	17	21	7	4
Hanover, town	2,396	22	45	28	40	7	14
Harmony, town	2,407	37	46	35	39	25	27
Jamestown, city	26,160	576	511	310	276	888	190
Kiantone, town	524	12	9	10	6	1	.....
Lakewood, village	552	3	1	13	10	8	3
Mayville, village	1,021	20	19	14	14	59	59
Mina, town	1,012	24	16	15	19	19	20
Panama, village	375	2	2	9	7	7	7
Poland, town	1,497	33	23	17	18	9	8
Pomfret, town	2,160	50	42	32	26	10	10
Portland, town	1,998	30	28	25	30	8	10
Ripley, town	2,257	41	42	24	27	325	251
Sheridan, town	1,861	18	26	20	21	5	3
Sherman, town	709	21	7	9	10	6	3
Sherman, village	797	15	16	12	13	20	8
Silver Creek, village	2,073	48	46	28	33	24	23
Sinclairville, village	507	8	7	11	8	9	4
Stockton, town	1,821	23	19	29	28	19	10
Villenova, town	1,054	24	26	17	23	6	6
Westfield, town	1,531	18	26	27	19	5	3
Westfield, village	2,823	53	52	55	46	98	81
Total	96,880	2,135	2,038	1,389	1,341	2,147	1,938

* Population included in that of the town of Chautauqua.

Chemung County

	Population.	Births.		Deaths.		Marriages.	
		1907.	1906.	1907.	1906.	1907.	1906.
Ashland, town	359	4	9	2	7	7	.....
Baldwin, town	506	5	9	4	5	1	3
Big Flats, town	1,571	28	24	28	36	10	8
Catlin, town	912	16	11	17	12	2	1
Chemung, town	1,328	16	13	29	18	7	12
Elmira, town	1,377	15	8	20	12	2	1
Elmira, city	34,678	568	536	563	513	714	677
Elmira Heights, village	*1,969	36	45	20	23	38	29
Erin, town	898	17	22	15	18	3	5
Horseheads, town	3,016	24	24	40	33	8	12
Horseheads, village	1,810	26	26	36	33	45	44
Southport, town	2,073	28	29	23	29	29	26
Van Etten, town	666	12	11	8	5	2	2
Van Etten, village	420	4	2	9	7	12	14
Veteran, town	1,475	17	21	25	21	9	15
Wellsburg, village	481	8	9	13	8	21	22
Total	51,600	824	799	852	780	910	871

Chenango County

	Population.	Births.		Deaths.		Marriages.	
		1907.	1906.	1907.	1906.	1907.	1906.
Afton, town	1,144	8	18	12	11	18	24
Afton, village	707	7	17	13	14	2	.....
Bainbridge, town	855	8	15	15	15	3	5
Bainbridge, village	1,113	10	11	25	23	14	18
Columbus, town	863	10	17	9	10	6	3
Coventry, town	889	7	5	21	6	4	2
German, town	430	7	8	6	2	3	3
Greene, town	1,806	34	27	24	27	4	12
Greene, village	1,358	22	17	17	23	26	14
Guilford, town	2,261	25	28	32	29	15	12
Lincklaen, town	607	13	12	13	8	2	4
McDonough, town	816	13	10	17	13	12	10
New Berlin, town	1,297	19	5	13	18	7	6
New Berlin, village	1,128	19	15	17	12	17	19
North Norwich, town	742	13	9	12	9	4	1
Norwich, town	1,332	16	16	30	23	5	3
Norwich, village	7,115	145	109	136	119	65	76
Otselic, town	1,111	11	16	22	13	9	7
Oxford, town	1,393	25	21	50	37	3	2
Oxford, village	1,865	31	35	36	30	17	21
Pharsalia, town	690	15	4	17	9	2	3
Pitcher, town	740	10	11	16	8	2	9
Plymouth, town	995	19	8	22	15	11	6
Preston, town	626	10	7	21	13	4	4
Sherburne, town	1,768	14	23	27	20	11	6
Sherburne, village	927	7	14	15	21	10	19
Smithville, town	994	5	16	13	16	5	3
Smyrna, town	922	14	16	7	13	9	8
Smyrna, village	271	1	6	8	4	6	5
Total	36,783	538	516	666	561	296	305

* Part of village in town of Horseheads.

Clinton County

	Population.	Births.		Deaths.		Marriages.	
		1907.	1906.	1907.	1906.	1907.	1906.
Altona, town	2,500	60	77	33	24	14	17
Ausable, town	2,399	29	29	12	21	8	1
Beekmantown, town	1,889	15	15	25	28	3	
Black Brook, town	2,129	14	10	23	22	19	1
Champlain, town	1,767	67	71	21	22	15	
Champlain, village	1,400	54	40	27	19	19	1
Chazy, town	2,835	96	107	38	48	45	
Clinton, town	1,590	42	33	28	23	9	
Dannemora, town	2,084	26	67	16	39	3	
Dannemora, village	633	12	8	17	13	16	
Ellenburgh, town	3,201	37	77	10	12	37	
Mooers, town	2,825	86	76	43	37	22	
Mooers, village	537	12	26	6	14	11	
Peru, town	2,354	48	53	32	25	16	
Plattsburgh, town	2,475	70	60	17	34	13	
Plattsburgh, city	10,184	253	179	139	130	172	1
Rouse's Point, village	1,674	5	11	1	7	37	
Saranac, town	3,156	99	80	29	42	17	1
Schuyler's Falls, town	1,642	13	12	23	24	23	
Total	47,282	1,038	1,031	540	584	499	4

Columbia County

	Population.	Births.		Deaths.		Marriages.	
		1907.	1906.	1907.	1906.	1907.	1906.
Ancram, town	1,212	32	17	16	18	7	
Austerlitz	926	7	9	17	16	4	
Canaan, town	1,266	5	5	16	14	12	
Chatham, town	1,403	31	19	49	51	22	
Chatham, village	2,090	26	33	36	19	45	
Claverack, town	2,488	24	39	40	29	19	
Clermont, town	768	8	18	13	8	10	
Copake, town	1,346	21	20	30	23	5	
Gallatin, town	751	7	7	17	15	6	
Germantown, town	1,634	29	33	25	17	8	
Ghent, town	2,581	32	24	53	55	7	
Greenport, town	1,151	25	16	17	15	4	
Hillsdale, town	1,423	27	9	27	24	13	1
Hudson, city	10,290	177	201	198	202	98	8
Kinderhook, town	1,131	10	15	21	23	5	
Kinderhook, village	856	10	13	22	15	12	
Livingston, town	1,605	18	20	22	25	10	1
New Lebanon, town	1,498	13	18	26	24	20	2
Philmont, village	1,971	24	24	24	10	31	
Stockport, town	2,569	44	44	34	42	13	1
Stuyvesant, town	1,908	25	40	28	26	5	
Taghkanic, town	760	11	17	16	18	2	
Valatie, village	1,231	30	26	22	26	13	1
Total	42,868	636	667	769	715	371	3

Cortland County.

	Population.	Births.		Deaths.		Marriages.	
		1907.	1906.	1907.	1906.	1907.	1906.
Cincinnatus, town	1,033	23	20	20	11	5	11
Cortland, city	11,272	207	165	154	150	100	107
Cortlandville, town	2,167	21	19	31	45	12	2
Cuyler, town	945	23	19	14	20	7	13
Freetown, town	539	9	10	4	4	1	3
Harford, town	679	13	8	14	15	7	7
Homer, town	1,487	20	22	20	16	2	5
Homer, village	2,536	34	39	49	50	24	26
Lapeer, town	442	6	7	3	3	2	3
McGrawville, village	879	11	9	12	9	26	23
Marathon, town	516	7	8	7	1	2	4
Marathon, village	1,042	11	9	18	13	10	15
Preble, town	841	14	7	6	11	9	5
Scott, town	708	12	13	14	12	2	5
Solon, town	540	12	8	5	9	2	4
Taylor, town	759	20	10	6	11	4	6
Truxton, town	1,186	15	21	19	24	6	2
Virgil, town	1,239	13	18	22	24	3	7
Willet, town	685	10	16	20	4	7	6
Total	29,503	481	428	438	432	231	254

Delaware County

	Population.	Births.		Deaths.		Marriages.	
		1907.	1906.	1907.	1906.	1907.	1906.
Andes, town	1,529	14	13	21	26	7	10
Andes, village	340	6	2	9	4	3	1
Bovina, town	916	13	17	12	8	4	5
Colchester, town	3,070	73	62	53	42	17	14
Davenport, town	1,560	31	26	17	29	18	7
Delhi, town	1,127	21	17	32	26	3	4
Delhi, village	1,781	33	36	40	26	21	19
Deposit, town	1,895	16	24	3	14	7	5
Franklin, town	1,951	26	32	25	22	8	8
Franklin, village	493	7	5	19	13	4	3
Hamden, town	1,386	30	32	23	17	10	15
Hancock, town	4,320	67	59	37	41	16	23
Hancock, village	1,381	15	17	27	18	65	50
Harpersfield, town	1,244	7	17	8	14	5	8
Hobart, village	503	7	4	5	14	2	2
Kortright, town	1,527	36	29	27	14	10	5
Margaretville, village	583	8	9	9	11	9	11
Masonville, town	1,120	18	18	10	16	8	5
Meredith, town	1,469	11	17	13	16	3	12
Middletown, town	3,236	53	66	40	45	23	29
Roxbury, town	2,206	25	19	25	28	9	8
Sidney, town	1,787	25	36	28	25	7	11
Sidney, village	2,532	35	40	34	30	51	34
Stamford, town	1,997	15	11	11	10	4	8
Stamford, village	*973	12	16	29	28	19	8
Tompkins, town	2,277	35	35	32	27	9	10
Walton, town	2,085	51	29	21	20	11	6
Walton, village	2,911	44	26	41	31	42	36
Total	46,788	734	714	651	615	395	357

* Part of village in Schoharie county.

Dutchess County

	Population.	Births.		Deaths.		Marriages.	
		1907.	1906.	1907.	1906.	1907.	1906.
Amenia, town	2,152	44	42	35	32	8	20
Beekman, town	933	9	12	5	12	3	2
Clinton, town	1,275	6	16	18	14	3	6
Dover, town	1,992	44	48	24	43	16	20
East Fishkill, town	2,088	38	45	30	36	9	18
Fishkill, town	3,081	83	81	54	61	6	1
Fishkill, village	579	3	9	10	5	10	10
Fishkill Landing, village	3,939	101	81	57	67	51	33
Hyde Park, town	2,944	40	33	37	40	21	17
La Grange, town	1,271	23	22	17	25	11	6
Matteawan, village	5,584	101	116	103	117	46	48
Milan, town	926	18	13	17	20	4	8
Millbrook, village	1,121	32	31	18	5	14	10
Millerton, village	775	10	8	10	8	60	64
North East, town	1,288	26	28	23	19	3	3
Pawling, town	1,107	23	27	21	16	3	4
Pawling, village	733	16	11	15	10	15	10
Pine Plains, town	1,315	23	17	31	26	10	11
Pleasant Valley, town	997	14	11	18	17	9	2
Pleasant Valley, village	429	3	3	12	4	5	5
Poughkeepsie, town	5,380	62	55	83	47	13	6
Poughkeepsie, city	25,379	574	471	525	441	353	317
Red Hook, town	1,261	24	30	31	19	11	15
Red Hook, village	1,572	15	18	27	10	10	12
Rhinebeck, town	2,063	27	27	29	33	17	16
Rhinebeck, village	1,547	36	37	22	30	13	15
Stanford, town	1,641	30	21	30	23	7	8
Tivoli, village	1,041	16	16	13	17	11	4
Union Vale, town	976	8	16	12	14	1	3
Wappinger, town	752	27	20	28	27	6	10
Wappingers Falls, village	3,588	108	70	54	38	22	29
Washington, town	1,892	27	35	45	38	1	12
Total	81,633	1,611	1,471	1,454	1,314	782	745

Erie County

	Population.	Births.		Deaths.		Marriages.	
		1907.	1906.	1907.	1906.	1907.	1906.
Akron, village	1,720	31	33	21	24	21	14
Alden, town	1,742	36	32	30	32	12	12
Alden, village	711	9	14	5	6	8	7
Amherst, town	3,526	61	37	41	45	13	16
Angola, village	806	17	11	17	17	14	13
Aurora, town	1,732	28	42	21	24	5	5
Blasdell, village	702	30	29	6	11	5	2
Boston, town	1,627	20	17	15	11	10	6
Brant, town	1,482	33	26	34	26	9	10
Buffalo, city	376,587	8,891	8,075	6,413	6,138	4,572	4,118
Cheektowaga, town	5,425	48	38	108	88	31	26
Clarence, town	2,817	52	57	39	30	34	22
Colden, town	1,307	23	30	28	24	10	10
Collins, town	*2,602	33	24	25	25	21	20
Concord, town	2,222	35	25	26	36	11	6
Depew, village	3,535	116	79	42	56	56	46
East Aurora, village	2,448	38	36	41	22	49	33
East Hamburg, town	2,575	44	47	29	38	9	8
Eden, town	2,495	40	41	33	24	14	19
Elma, town	2,155	39	39	29	33	23	2
Evans, town	2,061	25	25	38	31	12	17
Farnham, village	516	11	17	5	10	8	6
Grand Island, town	972	16	13	10	10	3	3
Hamburg, town	3,210	66	86	43	55	14	30
Hamburg, village	1,967	45	37	22	19	22	14

* Including population of village of Gowanda in Erie county.

Erie County — Continued

	Population.	Births.		Deaths.		Marriages.	
		1907.	1906.	1907.	1906.	1907.	1906.
Holland, town	1,451	15	28	29	20	10	11
Kenmore, village	506	3	1	.....	.....	.....	2
Lancaster, town	1,570	37	36	24	26	3	5
Lancaster, village	3,853	102	94	44	46	37	50
Marilla, town	1,513	19	10	27	12	7	10
Newstead, town	2,052	38	21	22	27	7	2
North Collins, town	2,514	49	44	28	29	21	13
Sardinia, town	1,843	12	21	23	16	9	8
Sloan, village	1,246	15	20	8	6	9	1
Springville, village	2,230	30	51	28	27	30	20
Tonawanda, town	1,005	10	11	19	24	32	6
Tonawanda, city	7,904	167	159	106	83	89	103
Wales, town	1,207	9	16	12	12	4	4
West Seneca, town	14,925	453	371	353	291	109	53
Williamsville, village	967	25	18	12	7	22	18
Total	473,700	10,771	9,811	7,846	7,461	5,375	4,771

Essex County

	Population.	Births.		Deaths.		Marriages.	
		1907.	1906.	1907.	1906.	1907.	1906.
Chesterfield, town	*2,117	36	27	14	30	1	3
Crown Point, town	1,890	21	24	27	39	26	23
Elizabethtown, town	678	8	14	6	10	3	5
Elizabethtown, village	519	7	4	5	7	8	5
Essex, town	1,344	20	27	29	21	7	9
Jay, town	1,985	45	36	45	39	19	20
Keene, town	1,328	13	20	15	20	4	4
Keeseville, village	†1,955	38	48	27	36	38	30
Lake Placid, village	1,514	46	38	25	20	15	18
Lewis, town	1,049	12	9	12	15	3	2
Minerva, town	1,012	9	16	16	15	10	14
Moriah, town	3,644	108	89	75	56	16	25
Newcomb, town	554	6	1	6	4	1	.....
North Elba, town	1,487	25	21	16	19	4	1
North Hudson, town	505	1	1	5	5	5	.....
Port Henry, village	2,073	70	85	34	41	46	38
St. Armand, town	879	8	10	13	15	3	9
Schroon, town	1,213	9	24	18	15	6	4
Ticonderoga, town	2,942	53	50	39	39	4	10
Ticonderoga, village	1,749	60	69	34	22	38	37
Westport, town	1,763	30	30	16	19	31	22
Willsboro, town	1,629	28	36	18	12	8	6
Wilmington, town	574	14	25	7	12	4	4
Total	32,452	667	704	502	511	300	289

* Including population of village of Keeseville, in Essex county.
† Part of village in Clinton county.

Franklin County

	Population.	Births.		Deaths.		Marriages.	
		1907.	1906.	1907.	1906.	1907.	1906.
Altamont, town	2,074	33	47	16	29	1	6
Bangor, town	2,184	54	34	33	50	20	34
Belmont, town	2,403	47	50	27	20	20	8
Bombay, town	1,386	15	38	15	50	11	26
Brandon, town	920	21	26	16	12	.....	1
Brighton, town	794	15	6	8	10	.....	.....
Burke, town	1,875	57	48	22	24	19	10
Chateaugay, town	1,587	29	52	20	26	2	4
Chateaugay, village	1,064	14	17	20	6	23	20
Constable, town	1,355	30	27	19	24	15	13
Dickinson, town	1,762	57	71	16	17	8	9
Duane, town	372	10	11	8	5	4	2
Fort Covington, town	1,226	32	43	20	22	.....	.....
Fort Covington, village	854	24	11	14	24	23	15
Franklin, town	1,496	27	19	23	24	1	7
Harrietstown, town	*4,113	12	3	9	13	1	.....
Malone, town	4,248	106	86	63	59	22	14
Malone, village	6,478	136	139	107	99	120	107
Moira, town	2,477	54	49	23	31	25	33
Santa Clara, town	1,053	13	16	13	11	4	2
Saranac Lake, village	†3,834	87	85	‡95	103	59	46
Tupper Lake, village	2,769	61	84	27	34	34	9
Waverly, town	2,160	80	62	39	24	23	19
Westville, town	1,149	22	18	24	24	2	1
Total	47,012	1,036	1,042	677	741	436	386

Fulton County

	Population.	Births.		Deaths.		Marriages.	
		1907.	1906.	1907.	1906.	1907.	1906.
Bleecker, town	527	7	16	12	4	3	2
Broadalbin, town	1,933	29	39	38	33	17	17
Caroga, town	449	5	16	5	7	2	.....
Ephratah, town	1,479	12	25	22	19	9	7
Gloversville, city	18,672	310	327	308	276	210	210
Johnstown, town	2,493	35	31	49	39	5	.....
Johnstown, city	9,845	158	167	154	120	105	77
Mayfield, town	1,526	29	23	24	25	6	1
Mayfield, village	603	9	12	4	5	5	5
Northampton, town	1,131	21	17	21	21	16	10
Northville, village	1,073	20	11	24	18	23	27
Oppenheim, town	1,258	5	12	15	20	5	1
Perth, town	676	4	5	8	3	4	3
Stratford, town	652	14	19	5	13	1	.....
Total	42,330	658	720	689	603	411	360

* Includes population of village of Saranac Lake in Franklin county.
† Part of village in Essex county.
‡ Including nonresident deaths.

Genesee County

	Population.	Births.		Deaths.		Marriages.	
		1907.	1906.	1907.	1906.	1907.	1906.
Alabama, town	1,644	30	28	18	23	3	14
Alexander, town	1,210	17	14	16	14	1	5
Alexander, village	207	.....	3	3	4	.....	1
Batavia, town	2,301	9	26	30	26	3	4
Batavia, village	10,080	169	107	155	160	136	121
Bergen, town	1,013	18	11	9	13	7	3
Bergen, village	601	8	9	11	15	6	6
Bethany, town	1,259	22	13	35	25	2	6
Byron, town	1,505	27	27	25	20	6	5
Corfu, village	481	17	15	12	14	4	7
Darien, town	1,850	35	15	21	23	8	9
Elba, town	1,140	12	11	10	10	4	6
Elba, village	404	5	9	1	6	4	4
Le Roy, town	1,712	38	30	21	21	4	8
Le Roy, village	3,395	75	69	60	54	42	37
Oakfield, town	929	20	23	15	26	1	3
Oakfield, village	873	33	19	14	16	12	7
Pavilion, town	1,546	17	2	19	27	11	8
Pembroke, town	1,968	8	28	27	20	14	15
Stafford, town	1,319	15	23	15	20	4	6
Total	35,878	628	482	517	537	271	275

Greene County

	Population.	Births.		Deaths.		Marriages.	
		1907.	1906.	1907.	1906.	1907.	1906.
Ashland, town	647	7	12	11	6	5	2
Athens, town	801	6	10	16	16	3	2
Athens, village	2,015	35	35	49	33	14	2
Cairo, town	1,960	21	30	58	37	14	7
Catskill, town	3,569	48	56	53	50	25	24
Catskill, village	5,294	100	95	95	97	61	46
Coxsackie, town	1,377	19	22	23	21	1	1
Coxsackie, village	2,940	65	81	67	60	27	23
Durham, town	1,616	24	18	22	25	18	8
Greenville, town	1,626	16	26	23	24	6	13
Halcott, town	363	10	7	8	5	.....	1
Hunter, town	1,418	42	28	25	17	12	25
Hunter, village	524	2	6	3	7	.....	.....
Jewett, town	1,044	5	5	7	9	3	1
Lexington, town	1,067	13	16	17	21	6	1
New Baltimore, town	2,087	26	32	35	29	23	15
Prattsville, town	761	20	12	14	16	10	12
Tannersville, village	589	22	19	11	11	7	2
Windham, town	1,427	18	27	23	33	10	10
Total	31,130	499	537	560	517	250	201

Hamilton County

	Population.	Births.		Deaths.		Marriages.	
		1907.	1906.	1907.	1906.	1907.	1906.
Arietta, town	295	5	3	3	3	.....	.....
Benson, town	215	5	2	3	5	.....	.....
Hope, town	317	2	5	3	2	.....	2
Indian Lake, town	1,049	19	29	11	14	11	10
Inlet, town	168	7	2	2	4	.....	.....
Lake Pleasant, town	494	2	10	3	8	2	3
Long Lake, town	1,233	23	16	10	7	13	4
Morehouse, town	216	4	2	3	1	2	.....
Wells, town	925	6	6	10	7	6	4
Total	4,912	73	75	48	51	34	23

Herkimer County

	Population.	Births.		Deaths.		Marriages.	
		1907.	1906.	1907.	1906.	1907.	1906.
Cold Brook, village	318	2	3	2	5	1	2
Columbia, town	1,180	8	16	15	17	4	4
Danube, town	934	9	6	10	11	2	1
Dolgeville, village	*2,245	60	34	21	30	26	13
Fairfield, town	753	13	9	11	12	3	1
Frankfort, town	1,747	18	27	33	27	5	5
Frankfort, village	2,870	113	93	54	48	38	27
German Flats, town	1,521	2	.....	14	18	1	4
Herkimer, town	1,227	6	15	19	25	3	.....
Herkimer, village	6,596	111	104	94	114	86	88
Ilion, village	5,924	99	96	92	83	34	33
Litchfield, town	881	8	11	7	5	4	.....
Little Falls, town	685	4	6	11	7	1	3
Little Falls, city	11,122	243	204	180	150	101	94
Manheim, town	†2,887	7	8	6	6	3	1
Middleville, village	597	16	5	6	6	3	2
Mohawk, village	2,044	25	30	30	36	23	20
Newport, town	1,018	2	7	6	6	5	1
Newport, village	672	7	5	11	18	1	5
Norway, town	682	9	5	10	12	1	3
Ohio, town	704	13	13	10	11	8	7
Old Forge, village	500	12	10	10	5	1	.....
Poland, village	366	9	5	5	6	1	2
Russia, town	1,372	9	14	11	13	3	4
Salisbury, town	1,373	16	20	16	26	9	8
Schuyler, town	1,192	12	9	17	6	2	5
Stark town	999	13	19	11	18	8	3
Warren, town	1,152	16	16	20	14	4	8
Webb, town	1,255	16	12	11	15	3	4
West Winfield, village	749	10	9	11	16	13	58
Wilmurt, town	309	6	2	1	2	1	.....
Winfield, town	711	20	10	15	9	1	.....
Total	53,856	914	823	770	777	399	406

Jefferson County

	Population.	Births.		Deaths.		Marriages.	
		1907.	1906.	1907.	1906.	1907.	1906.
Adams, town	1,728	25	19	21	30	20	8
Adams, village	1,449	30	15	25	21	24	20
Alexandria, town	2,407	51	47	42	25	24	22
Alexandria Bay, village	1,854	40	45	22	32	16	13
Antwerp, town	1,918	25	36	24	23	17	10
Antwerp, village	1,014	13	17	20	17	15	8
Belleville, village	346	8	5	9	10	6	6
Black River village	969	15	17	13	22	8	12
Brownville, town	1,426	11	17	23	10	6	3
Brownville, village	865	19	7	11	13	34	21
Cape Vincent, town	1,566	17	12	16	28	11	16
Cape Vincent, village	1,231	25	31	16	10	14	2
Carthage, village	3,404	68	42	51	45	73	54
Champion, town	1,291	5	5	17	17	11	9
Chaumont, village	691	4	3	15	18	9	7
Clayton, town	2,177	36	38	27	38	16	17
Clayton, village	1,918	40	47	26	24	28	23
Dexter, village	1,031	25	29	13	17	17	9
Ellisburg, town	2,734	43	51	46	45	20	9
Ellisburg, village	310	10	3	8	4	2	2
Glen Park, village	582	23	5	13	11	5	1
Henderson, town	1,173	18	17	21	13	4	1
Henderson, village	344	2	2	3	8	2	1
Hounsfield, town	1,443	19	17	19	25	3	1

* Part of village in Fulton county.
† Including population of village of Dolgeville in Herkimer county.

Jefferson County — Continued

	Population.	Births.		Deaths.		Marriages.	
		1907.	1906.	1907.	1906.	1907.	1906.
Le Ray, town	2,684	34	20	34	26	10	13
Lorraine, town	949	16	21	11	7	6	9
Lyme, town	1,407	22	18	11	10	11	12
Mannsville, village	350	3	4	10	7	4	4
Orleans, town	2,433	54	48	40	33	15	16
Pamelia, town	898	10	12	22	39	4	2
Philadelphia, town	843	24	16	14	21	7	6
Philadelphia, village	856	13	12	20	20	13	5
Rodman, town	1,144	22	18	20	11	4	8
Rutland, town	914	8	8	18	11	6	7
Sacketts Harbor, village	903	16	14	15	19	10	12
Theresa, town	1,130	18	27	11	15	6	5
Theresa, village	892	16	7	16	12	7	10
Watertown, town	1,128	9	15	21	14	2	3
Watertown, city	25,447	592	445	504	461	368	306
West Carthage, village	1,377	23	15	18	14	8	7
Wilna, town	2,462	50	16	30	15	22	12
Worth, town	728	13	16	10	7	3	1
Total	80,459	1,514	1,259	1,326	1,248	891	713

Lewis County

	Population.	Births.		Deaths.		Marriages.	
		1907.	1906.	1907.	1906.	1907.	1906.
Constableville, village	447	7	7	10	6	5	8
Copenhagen, village	642	4	1	11	2	7	13
Croghan, town	2,983	58	46	23	21	19	15
Croghan, village	.....	5	.....	3	.....	1	.....
Denmark, town	1,467	16	10	25	25	7	5
Diana, town	1,555	31	9	15	12	5	3
Greig, town	911	23	20	12	12	2	5
Harrisburgh, town	731	9	11	8	4	2	1
Harrisville, village	780	28	17	11	12	12	21
Highmarket, town	589	8	11	9	9	.....	.....
Lewis, town	861	10	13	11	12	6	1
Leyden, town	925	18	16	18	13	12	6
Lowville, town	1,402	18	25	24	25	9	7
Lowville, village	2,519	35	44	42	49	35	52
Lyonsdale, town	1,082	12	18	15	9	3	2
Lyons Falls, village	709	19	13	10	7	2	2
Martinsburgh, town	1,749	22	33	20	29	7	6
Montague, town	616	1	10	6	12	2	2
New Bremen, town	1,764	41	29	21	37	4	6
Osceola, town	513	5	10	4	5	.....	.....
Pinckney, town	846	9	6	15	10	7	8
Port Leyden, village	717	15	3	14	8	8	6
Turin, town	745	13	11	6	12	.....	.....
Turin, village	389	2	4	2	6	2	.....
Watson, town	890	14	6	13	17	5	4
West Turin, town	807	9	11	8	9	16	16
Total	26,643	432	384	356	363	178	189

Livingston County

	Population.	Births.		Deaths.		Marriage	
		1907.	1906.	1907.	1906.	1907.	19
Avon, town	1,356	26	14	22	7	4	
Avon, village	1,782	41	34	36	36	19	
Caledonia, town	1,009	13	14	11	12	1	
Caledonia, village	1,221	13	26	23	10	9	
Conesus, town	1,069	16	5	19	11	7	...
Dansville, village	3,908	67	56	69	52	53	
Geneseo, town	1,093	20	14	44	28	26	
Geneseo, village	2,245	30	33	25	25	8	
Groveland, town	1,462	28	27	14	19	13	
Leicester, town	1,414	30	27	22	14	8	
Lima, town	1,290	9	23	10	19	.....	
Lima, village	972	15	15	17	18	8	
Livonia, town	1,962	47	61	41	27	8	
Livonia, village	782	2	13	5	6	11	
Mount Morris, town	1,337	36	20	19	11	3	
Mount Morris, village	2,611	21	25	46	46	59	
North Dansville, town	374	5	5	1	3	.....	...
Nunda, town	1,274	23	22	14	23	9	
Nunda, village	1,000	12	15	15	21	22	
Ossian, town	802	9	2	8	6	1	...
Portage, town	1,002	28	14	16	17	7	
Sparta, town	1,015	6	10	15	12	6	
Springwater, town	1,861	21	30	30	26	11	
West Sparta, town	807	13	13	11	13	3	
York, town	2,790	36	50	30	35	6	
Total	36,450	567	568	562	497	302	

Madison County

	Population.	Births.		Deaths.		Marriage	
		1907.	1906.	1907.	1906.	1907.	19
Brookfield, town	2,003	29	33	37	38	9	
Brookfield, village	434	10	2	10	11	5	...
Canastota, village	3,244	67	82	67	65	52	
Cazenovia, town	1,801	25	20	27	26	14	
Cazenovia, village	1,756	33	37	23	34	13	
Chittenango, village	639	13	16	12	17	17	
De Ruyter, town	704	11	11	13	12	3	
De Ruyter, village	597	2	6	9	20	7	
Earlville, village	*765	10	12	15	10	15	
Eaton, town	1,909	13	24	45	53	7	
Fenner, town	822	19	14	14	11	3	
Georgetown, town	896	24	19	17	14	6	
Hamilton, town	†2,092	28	22	23	27	7	
Hamilton, village	1,522	26	25	28	20	29	
Lebanon, town	1,099	21	22	28	12	5	
Lenox, town	1,765	17	16	17	20	2	
Lincoln, town	1,000	23	12	13	16	6	
Madison, town	1,664	32	29	22	29	12	
Madison, village	313	6	8	9	7	2	
Morrisville, village	565	6	7	8	19	5	
Nelson, town	1,136	14	22	14	18	2	
Oneida, city	8,420	169	168	123	132	66	
Smithfield, town	829	15	15	11	13	4	
Stockbridge, town	1,576	25	27	32	24	9	
Sullivan, town	2,894	45	55	38	41	15	
Total	39,690	683	704	655	689	315	

*Part of village in Chenango County.
†Including population of village of Earlville in Madison County, but not village Hamilton.

Monroe County

	Population.	Births.		Deaths.		Marriages.	
		1907.	1906.	1907.	1906.	1907.	1906.
town	3,125	45	42	30	40	4	5
, village	3,627	62	43	52	57	41	39
village	1,834	21	33	25	29	23	22
ı	2,024	28	29	37	24	5	6
e, village	645	11	8	5	15	11	7
town	1,567	25	29	20	19	8	9
village	2,598	48	48	58	32	38	40
m	3,739	60	42	54	46	7	6
wn	4,408	53	57	97	91	10	21
own	2,171	42	47	36	24	15	16
town	1,959	15	38	33	36	8	6
llage	568	5	11	12	8	10	12
Falls, village	1,208	10	17	20	21	7	4
it, town	3,160	76	45	41	43	9	9
own	1,724	28	23	22	13	3	16
wn	1,858	27	30	17	38	6	5
wn	2,237	31	33	40	19	9	7
own	3,139	54	69	28	34	14	14
town	2,758	39	67	44	39	4	13
town	1,625	39	32	24	23	.....	12
village	1,056	20	19	12	21	27	22
ı	1,362	21	26	23	15	.....	8
city	181,666	4,174	3,800	2,964	2,783	2,216	2,029
n	1,415	2	10	23	8	4	8
rt, village	753	5	5	11	8	14	10
own	1,289	21	13	25	18	7	7
own	3,570	53	83	38	46	12	18
illage	850	15	3	7	.....	2	2
l, town	2,321	63	57	36	31	15	11
.....	239,434	5,083	4,759	3,833	3,581	2,529	2,384

Montgomery County

	Population.	Births.		Deaths.		Marriages.	
		1907.	1906.	1907.	1906.	1907.	1906.
n, town	1,850	14	15	22	32	2	14
n, city	23,943	561	561	422	422	294	217
e, town	1,758	15	23	22	19	5	11
e, village	2,224	29	32	36	31	29	21
, town	932	15	20	9	12	3	4
wn	2,012	12	13	21	25	7	5
age	1,131	31	22	26	22	23	15
, village	2,596	45	35	71	28	45	34
, village	912	12	9	15	11	12	6
.....	1,279	11	20	13	14	2	5
village	815	12	18	17	15	13	6
wn	1,995	21	17	24	27	5	6
own	1,476	7	10	21	19	2	3
illage	709	19	8	9	12	1	2
own	1,383	19	28	40	24	9	2
ridge, village	318	7	6	4	6	2	.....
ı	1,607	22	19	26	28	5	8
ille, town	801	3	8	18	9	4	5
ille, village	2,172	35	48	39	38	43	28
.....	49,928	890	912	855	794	506	392

Nassau County

	Population.	Births.		Deaths.		Marriages.	
		1907.	1906.	1907.	1906.	1907.	1906.
East Rockaway, village	577	9	15	10	11	5	7
Farmingdale, village	1,234	27	27	10	22	17	12
Freeport, village	4,012	57	29	46	67	41	30
Hempstead, town	21,564	534	466	342	329	146	145
Hempstead, village	4,145	75	71	61	53	47	36
Lawrence, village	1,500	5	13	1	4	4	7
North Hempstead, town	14,163	320	278	232	245	70	74
Oyster Bay, town	17,561	313	262	246	250	98	81
Rockville Center, village	2,645	57	50	38	37	31	31
Sea Cliff, village	1,750	21	24	27	18	15	13
Total	69,477	1,130	1,235	1,013	1,045	474	438

New York (Greater)

	Population.	Births.		Deaths.		Marriages.	
		1907.	1906.	1907.	1906.	1907.	1906.
City of New York:							
Borough of Manhattan	2,174,335	65,771	63,006	41,319	39,831	33,829	32,342
Borough of The Bronx	290,097	8,487	7,306	6,379	6,277	2,268	2,027
Borough of Brooklyn	1,404,589	38,632	34,538	26,043	25,024	12,916	11,966
Borough of Queens	209,685	5,825	5,050	3,857	3,583	1,490	1,450
Borough of Richmond	74,174	2,001	1,873	1,607	1,488	594	600
Total	4,244,411	120,716	111,773	79,205	76,203	51,097	48,385

Niagara County

	Population.	Births.		Deaths.		Marriages.	
		1907.	1906.	1907.	1906.	1907.	1906.
Cambria, town	1,782	29	15	18	18	25	17
Hartland, town	2,652	53	90	28	41	23	16
La Salle, village	1,023	40	24	13	14	13	4
Lewiston, town	2,317	42	41	51	31	10	13
Lewiston, village	716	14	9	19	12	12	11
Lockport, town	2,371	35	32	74	67	4	13
Lockport, city	17,552	316	339	272	243	175	156
Middleport, village	1,358	23	16	17	16	22	10
Newfane, town	3,707	85	70	57	43	26	26
Niagara, town	339	1	4	6	2	1	1
Niagara Falls, city	26,560	637	567	511	431	563	601
North Tonawanda, city	10,157	293	270	138	140	144	122
Pendleton, town	1,263	16	12	18	8	11	10
Porter, town	1,632	35	46	23	18	13	5
Royalton, town	3,339	68	67	36	39	21	22
Somerset, town	2,069	39	38	27	23	10	16
Wheatfield, town	1,855	35	27	24	29	10	13
Wilson, town	2,342	46	34	38	32	4	11
Wilson, village	651	6	1	6	13	6	5
Youngstown, village	570	8	8	10	8	7	5
Total	84,744	1,821	1,710	1,386	1,228	1,100	1,077

Oneida County

	Population.	Births.		Deaths.		Marriages.	
		1907.	1906.	1907.	1906.	1907.	1906.
Annsville, town	1,621	22	26	32	28	3	10
Augusta, town	1,219	9	7	26	15	2	6
Ava, town	609	5	13	9	4	2	.....
Boonville, town	1,433	33	28	13	26	1	4
Boonville, village	1,734	27	25	50	25	24	17
Bridgewater, town	700	9	14	7	7	4	9
Bridgewater, village	261	1	6	9	8	0	3
Camden, town	1,330	19	30	17	23	7	7
Camden, village	2,420	29	36	35	32	26	22
Cayville, village	357	9	6	11	8	12	1
Clinton, village	1,315	21	2	31	21	11	12
Deerfield, town	1,615	23	21	19	18	6	2
Florence, town	1,086	8	6	16	14	2	4
Floyd, town	739	7	11	4	7	2	1
Forestport, town	768	8	9	5	9	2	6
Forestport, village	689	7	7	7	5	3	2
Holland Patent, village	320	1	4	7	6	14	6
Kirkland, town	3,228	40	31	38	56	12	9
Lee, town	1,485	22	32	21	15	12	6
Marcy, town	1,385	16	11	13	20	6	5
Marshall, town	1,762	26	21	21	16	5	7
New Hartford, town	4,420	98	80	39	59	23	10
New Hartford, village	1,043	21	14	12	18	16	31
Oneida Castle, village	357	3	4	2	4	8	4
Oriskany Falls, village	813	9	8	9	10	9	11
Paris, town	2,073	26	34	37	30	11	21
Prospect, village	330	2	2	6	3	7	2
Remsen, town	660	5	2	7	5	2	4
Remsen, village	399	4	1	5	5	8	3
Rome, city	16,562	445	409	342	338	112	123
Sangerfield, town	736	21	26	7	17	2	3
Steuben, town	788	19	17	14	9	4	2
Sylvan Beach, village	*	5	.....	4	4	1	2
Trenton, town	1,595	24	46	25	28	5	2
Trenton, village	317	2	9	5	7	4	5
Utica, city	62,934	1,529	1,350	1,266	1,228	476	449
Vernon, town	2,285	23	27	28	31	9	7
Vernon, village	430	9	3	10	6	1	3
Verona, town	3,636	46	41	47	42	15	19
Vienna, town	1,958	19	11	28	27	15	11
Waterville, village	1,510	24	9	25	29	8	12
Western, town	1,442	20	24	17	14	9	6
Westmoreland, town	2,067	23	23	28	38	10	7
Whitesboro, village	2,018	31	22	33	29	28	45
Whitestown, town	4,353	108	115	61	75	57	19
Yorkville, village	524	9	7	8	6	0	2
Total	139,341	2,876	2,630	2,443	2,420	996	942

*Included in town of Vienna.

Onondaga County

	Population.	Births.		Deaths.		Marriages.	
		1907.	1906.	1907.	1906.	1907.	1906.
Baldwinsville, village	2,961	32	28	42	40	37	38
Camillus, town	1,880	27	29	32	29	7	7
Camillus, village	706	14	12	8	11	4	4
Cicero, town	2,451	27	47	31	28	18	25
Clay, town	2,410	30	42	30	27	9	13
De Witt, town	2,718	39	28	60	40	16	31
East Syracuse, village	2,996	78	70	39	27	26	10
Eastwood, village	538	20	15	1	2	0	.....
Elbridge, town	1,507	15	31	20	22	5	3
Elbridge, village	569	4	9	6	9	5	1
Fabius, town	1,199	23	25	23	17	12	12
Fabius, village	346	2	3	6	3	3	7
Fayetteville, village	1,380	14	29	26	29	24	22
Geddes, town	794	6	14	6	15	3	4
Jordan, village	965	5	8	16	20	11	6
La Fayette, town	1,489	23	26	15	24	5	4
Liverpool, village	1,144	18	22	19	13	7	8
Lysander, town	1,418	39	20	39	33	14	9
Manlius, town	3,205	48	66	28	55	10	12
Manlius, village	1,236	27	26	23	22	12	10
Marcellus, town	2,073	42	37	23	21	12	4
Marcellus, village	671	18	8	7	6	5	7
Onondaga, town	5,324	66	51	165	124	36	21
Otisco, town	1,131	23	18	10	14	9	6
Pompey, town	2,381	32	29	35	44	6	3
Salina, town	2,682	23	23	46	25	8	14
Skaneateles, town	2,677	46	50	28	32	7	5
Skaneateles, village	1,584	20	18	29	19	19	17
Solvay, village	4,196	92	116	59	56	21	20
Spafford, town	1,130	15	24	10	25	1	2
Syracuse, city	117,503	2,450	2,028	1,916	1,846	1,045	861
Tully, town	863	8	12	7	13	3	2
Tully, village	600	7	6	12	13	9	13
Van Buren, town	3,147	25	32	29	21	14	12
Total	178,441	3,358	3,002	2,846	2,725	1,423	1,213

Ontario County

	Population.	Births.		Deaths.		Marriages.	
		1907.	1906.	1907.	1906.	1907.	1906.
Bristol, town	1,268	29	23	20	15	11	8
Canadice, town	577	8	17	5	12	4	1
Canandaigua, town	2,236	34	32	28	21	6	1
Canandaigua, village	7,332	128	130	137	156	108	106
Clifton Springs, village	1,586	22	27	37	42	14	15
East Bloomfield, town	1,979	20	22	26	23	11	5
Farmington, town	1,611	23	43	23	19	3	1
Geneva, town	1,080	21	21	8	17	1	3
Geneva, city	12,249	258	214	179	203	148	129
Gorham, town	2,222	23	33	15	31	13	18
Hopewell, town	1,470	18	21	52	31	2	5
Manchester, town	1,482	31	38	28	40	9	9
Manchester, village	784	29	21	15	12	5	3
Naples, town	1,252	31	19	13	18	4	6
Naples, village	1,098	12	15	11	14	17	8
Phelps, town	3,405	53	38	40	24	3	8
Phelps, village	1,352	15	19	20	22	6	13
Richmond, town	1,380	24	24	19	20	9	6
Seneca, town	2,717	37	47	26	35	14	12
Shortsville, village	957	22	18	11	8	6	8
South Bristol, town	1,011	12	17	9	12	3	1
Victor, town	1,581	42	38	16	12	6	8
Victor, village	806	12	14	12	9	11	14
West Bloomfield, town	1,244	19	16	25	12	5	7
Total	52,689	923	907	774	808	419	395

Orange County

	Population.	Births.		Deaths.		Marriages.	
		1907.	1906.	1907.	1906.	1907.	1906.
Blooming Grove, town	1,435	10	13	26	22	6	10
Chester, town	923	24	29	19	17	10	8
Chester, village	1,205	24	19	13	15	3	18
Cornwall, town	2,915	33	55	37	25	22	19
Cornwall, village	1,945	40	39	48	41	15	11
Crawford, town	1,626	25	26	21	16	14	14
Deerpark, town	1,867	34	14	32	22	12	8
Goshen, town	1,924	27	18	52	53	1	4
Goshen, village	3,099	31	29	61	58	31	39
Greenville, town	672	4	7	10	10	1	7
Hamptonburgh, town	1,158	20	25	11	23	7	7
Highlands, town	3,561	29	127	20	59	4	23
Highland Falls, village	.....	78	.....	52	.....	22	.....
Middletown, city	14,516	242	236	237	240	168	175
Minisink, town	1,023	7	27	16	20	5	2
Monroe, town	1,030	15	11	15	11	9	7
Monroe, village	1,008	23	21	15	16	12	13
Montgomery, town	1,954	34	37	32	35	12	10
Montgomery, village	961	14	13	23	16	14	18
Mount Hope, town	1,128	21	19	24	28	12	6
Newburgh, town	4,785	27	14	60	42	8	7
Newburgh, city	26,498	500	520	530	526	322	291
New Windsor, town	2,887	26	32	38	38	9	10
Port Jervis, city	9,695	162	182	180	176	148	135
Tuxedo, town	2,865	21	20	37	29	11	14
Unionville, village	331	4	7	6	8	2	2
Walden, village	3,737	75	77	50	53	24	33
Wallkill, town	2,736	27	21	41	20	9	8
Warwick, town	4,923	51	46	68	51	43	34
Warwick, village	1,767	26	17	24	23	27	21
Washingtonville, village	664	2	4	10	11	5	10
Wawayanda, town	1,574	35	18	17	21	5	3
Woodbury, town	1,822	30	31	42	41	15	13
Total	108,267	1,721	1,754	1,867	1,766	1,008	980

Orleans County

	Population.	Births.		Deaths.		Marriages.	
		1907.	1906.	1907.	1906.	1907.	1906.
Albion, town	1,225	39	29	26	40	8	10
Albion, village	5,174	108	101	75	68	57	48
Barre, town	1,809	26	39	24	14	7	11
Carlton, town	2,236	43	34	31	27	14	16
Clarendon, town	1,455	17	23	22	17	7	3
Gaines, town	1,839	18	35	14	24	15	9
Holley, village	1,506	44	31	37	19	12	14
Kendall, town	1,638	26	35	30	35	8	10
Lyndonville, village	512	7	9	14	9	12	7
Medina, village	5,114	103	84	84	84	55	40
Murray, town	2,425	62	58	32	20	14	21
Ridgeway, town	1,016	33	20	33	24	11	11
Shelby, town	3,900	34	33	22	22	6	6
Yates, town	1,449	29	19	14	22	1	2
Total	31,323	589	550	458	425	227	208

Oswego County

	Population.	Births.		Deaths.		Marriages.	
		1907.	1906.	1907.	1906.	1907.	1906.
Albion, town	1,262	14	14	16	21	2	2
Altmar, village	373	7	7	11	3	2	8
Amboy, town	771	12	7	13	9	8	4
Boylston, town	743	12	10	21	7	0	2
Central Square, village	334	6	9	10	9	17	15
Cleveland, village	753	20	17	12	7	6	3
Constantia, town	1,542	22	17	20	22	9	10
Fulton, city	8,847	217	205	116	141	75	71
Granby, town	2,038	28	19	24	28	5	5
Hannibal, town	1,883	26	20	27	16	4	8
Hannibal, village	386	5	5	2	3	14	12
Hastings, town	1,839	20	28	36	25	4	2
Lacona, village	380	4	6	13	9	4	1
Mexico, town	1,810	21	19	55	47	7	12
Mexico, village	1,269	19	14	34	36	24	22
New Haven, town	1,399	21	30	39	22	17	7
Orwell, town	1,029	19	34	18	10	11	7
Oswego, town	2,550	24	30	49	48	17	18
Oswego, city	22,572	431	407	360	376	204	158
Palermo, town	1,361	23	18	26	22	13	12
Parish, town	868	10	11	13	12	11	8
Parish, village	515	3	6	6	6	2	11
Phoenix, village	1,524	29	32	33	28	23	12
Pulaski, village	1,575	28	19	19	29	35	4
Redfield, town	792	16	13	5	11	2	9
Richland, town	2,036	37	39	30	24	10	7
Sandy Creek, town	1,103	12	18	22	20	0	9
Sandy Creek, village	734	9	9	8	12	7	12
Schroeppel, town	1,362	18	25	19	27	5	6
Scriba, town	2,246	30	20	32	26	7	10
Volney, town	2,339	36	22	27	26	12	9
West Monroe, town	914	11	13	7	15	3	9
Williamstown, town	954	12	10	13	12	11	11
Total	70,110	1,202	1,153	1,136	1,109	571	496

Otsego County

	Population.	Births.		Deaths.		Marriages.	
		1907.	1906.	1907.	1906.	1907.	906.
Burlington, town	1,151	10	24	16	17	3	6
Butternuts, town	1,149	20	28	16	22	8	.....
Cherry Valley, town	985	8	14	17	15	1	2
Cherry Valley, village	746	16	9	12	11	9	14
Cooperstown, village	2,446	39	26	42	43	53	33
Decatur, town	502	8	10	6	5	0	2
Edmeston, town	1,679	18	40	17	41	16	14
Exeter, town	1,033	10	4	14	16	4	4
Gilbertsville, village	469	6	4	7	9	3	7
Hartwick, town	1,817	35	28	29	27	17	18
Laurens, town	1,264	23	33	18	17	8	8
Laurens, village	236	1	7	6	5	1	1
Maryland, town	1,221	18	16	17	21	4	.....
Middlefield, town	1,869	26	22	30	29	6	5
Milford, town	1,387	11	20	19	25	6	13
Milford, village	526	8	13	6	7	5	7
Morris, town	1,019	14	12	16	8	5	4
Morris, village	561	0	6	11	7	10	6
New Lisbon, town	1,088	13	17	25	21	6	2
Oneonta, town	1,874	28	29	42	36	15	8
Oneonta, village	8,054	143	136	163	131	134	118
Otego, town	1,057	21	20	20	13	8	5
Otego, village	651	12	20	12	16	6	9
Otsego, town	2,036	22	28	29	38	10	6
Pittsfield, town	970	18	11	9	13	5	2

Otsego County — Continued

	Population.	Births.		Deaths.		Marriages.	
		1907.	1906.	1907.	1906.	1907.	1906.
Plainfield, town	889	15	7	15	12	8	6
Richfield, town	949	14	16	10	21	3	4
Richfield Springs, village	1,684	30	16	43	29	17	22
Roseboom, town	954	16	15	16	12	2	4
Schenevus, village	560	8	10	11	6	7	8
Springfield, town	1,604	21	24	33	22	8	9
Unadilla, town	1,369	17	22	22	25	13	7
Unadilla, village	1,142	18	14	14	15	12	21
Westford, town	912	19	14	8	10	11	6
Worcester, town	2,328	35	43	42	33	14	19
Total	48,209	721	758	813	778	438	400

Putnam County

	Population.	Births.		Deaths.		Marriages.	
		1907.	1906.	1907.	1906.	1907.	1906.
Brewster, village	1,277	30	24	19	9	86	83
Carmel, town	2,601	53	33	49	30	18	13
Cold Spring, village	2,339	45	23	51	48	15	29
Kent, town	887	13	19	20	24	8	9
Nelsonville, village	671	10	4	10	9	0	1
Patterson, town	1,680	21	24	22	22	7	5
Philipstown, town	1,967	20	16	30	22	5	7
Putnam Valley, town	949	8	14	17	20	3	3
South East, town	1,796	23	39	32	28	3	4
Total	14,169	223	196	250	212	145	154

Rensselaer County

	Population.	Births.		Deaths.		Marriages.	
		1907.	1906.	1907.	1906.	1907.	1906.
Berlin, town	1,623	31	29	30	16	15	12
Brunswick, town	2,714	42	30	44	23	22	15
Castleton, village	1,267	13	24	15	23	17	8
East Greenbush, town	1,321	16	11	17	20	9	7
Grafton, town	1,075	7	7	26	11	4	4
Hoosick, town	2,966	15	41	39	44	9	24
Hoosick Falls, village	5,251	108	106	90	82	79	86
Nassau, town	1,536	22	23	40	35	4	6
Nassau, village	455	5	4	11	12	8	10
North Greenbush, town	1,222	4	13	16	17	5	1
Petersburg, town	1,350	19	28	19	23	23	6
Pittstown, town	3,099	44	47	38	44	12	13
Poestenkill, town	1,143	8	11	21	21	5	6
Rensselaer, city	10,715	213	137	171	163	88	77
Sand Lake, town	2,205	29	30	36	25	14	24
Schaghticoke, town	1,102	22	17	35	18	17	3
Schaghticoke, village	1,191	21	26	19	18	6	3
Schodack, town	3,157	49	52	38	38	18	8
Stephentown, town	1,424	19	37	22	11	13	13
Troy, city	76,910	1,041	896	1,626	1,551	624	563
Valley Falls, village	888	8	10	6	9	6	5
Total	122,637	1,776	1,579	2,359	2,204	998	894

Rockland County

	Population.	BIRTHS.		DEATHS.		MARRIAGE	
		1907.	1906.	1907.	1906.	1907.	19
Clarkstown, town	7,021	116	79	92	86	35	
Grand View-on-Hudson, village	356	3	1	4	3	0	..
Haverstraw, town	1,952	37	14	23	7	20	
Haverstraw, village	6,182	73	90	86	87	38	
Hillburn, village	878	20	29	15	10	12	
Nyack, village	4,441	75	80	92	97	52	
Orangetown, town	5,030	42	58	49	58	26	
Piermont, village	1,193	22	4	30	37	10	
Ramapo, town	4,026	96	115	86	82	33	
South Nyack, village	1,848	26	26	18	30	17	
Spring Valley, village	2,583	59	57	34	21	17	
Stony Point, town	3,862	82	69	58	51	23	
Suffern, village	2,655	56	57	34	46	20	
Upper Nyack, village	648	6	4	4	8	1	..
West Haverstraw, village	2,348	20	62	25	24	4	
Total	45,032	733	745	650	647	308	

St. Lawrence County

	Population.	BIRTHS.		DEATHS.		MARRIAGE	
		1907.	1906.	1907.	1906.	1907.	19
Brasher, town	2,333	31	32	22	34	20	
Canton, town	3,715	65	67	65	73	15	
Canton, village	3,083	43	62	52	43	57	
Clare, town	329	7	2	6	5	0	
Clifton, town	1,717	57	59	24	29	21	
Colton, town	2,099	46	41	38	36	12	
De Kalb, town	2,161	28	46	37	25	15	
De Peyster, town	952	12	13	6	10	5	
Edwards, town	943	19	22	9	21	5	
Edwards, village	438	19	14	5	9	7	
Fine, town	2,371	39	43	23	20	22	
Fowler, town	1,756	18	14	22	20	7	
Gouverneur, town	2,353	57	49	40	36	11	
Gouverneur, village	4,229	71	57	58	68	66	
Hammond, town	1,484	37	32	10	17	4	
Hammond, village	385	7	12	6	2	10	
Hermon, town	988	5	9	19	9	1	
Hermon, village	517	19	7	13	7	13	
Hopkinton, town	1,509	22	20	10	15	6	
Lawrence, town	860	32	25	27	22	34	
Lisbon, town	3,166	11	12	39	30	22	
Louisville, town	1,553	27	28	22	25	6	
Macomb, town	1,245	20	26	18	9	6	
Madrid, town	1,664	21	23	25	25	13	
Massena, town	1,692	39	37	25	15	16	
Massena, village	2,547	96	93	51	44	57	
Morristown, town	1,404	12	29	12	11	4	
Morristown, village	429	5	7	4	6	18	
Norfolk, town	2,864	77	68	44	39	16	
Norwood, village	1,779	47	51	31	29	23	
Ogdensburg, city	13,179	287	324	263	266	191	
Oswegatchie, town	2,303	11	14	28	32	13	
Parishville, town	2,111	41	34	31	41	18	
Piercefield, town	862	27	27	7	10	3	
Pierrepont, town	1,641	29	11	25	16	1	
Pitcairn, town	965	27	14	19	22	5	
Potsdam, town	3,051	28	43	30	32	12	
Potsdam, village	4,162	80	52	81	53	67	
Richville, village	354	4	8	4	7	6	
Rossie, town	1,192	20	13	10	22	10	
Russell, town	2,036	37	24	26	32	15	
Stockholm, town	2,711	45	41	34	38	17	
Waddington, town	1,197	21	17	8	12	4	
Waddington, village	708	11	6	16	13	10	
Total	90,045	1,620	1,628	1,345	1,330	884	

Saratoga County

	Population.	Births.		Deaths.		Marriages.	
		1907.	1906.	1907.	1906.	1907.	1906.
town	2,040	6	15	19	23	4	11
Spa, village	4,131	70	40	62	59	50	47
town	971	11	11	18	19	7	4
ark, town	2,247	42	36	38	38	12	14
own	1,086	16	14	16	33	4	5
illage	2,186	65	80	28	23	20	19
a	643	11	11	10	13	5	1
, town	924	8	9	27	12	4	13
own	1,098	18	19	21	15	3	6
illage	149	1	.....	2	3	1	3
l, town	1,735	22	19	21	19	15	15
own	776	11	15	17	19	3	4
n, town	1,868	20	13	38	32	11	8
n	1,324	4	8	14	22	3	9
rille, village	5,877	181	206	94	94	66	72
wn	1,888	49	84	63	77	7	9
own	1,094	19	18	20	16	2	12
erland, town	1,255	20	21	25	13	6	1
e, town	538	9	11	9	6	1	1
town	1,715	21	11	25	28	1	12
Springs, town	1,349	3	3	16	16	4	1
Springs, village	12,999	258	292	289	274	114	133
lle, village	1,529	35	36	17	26	24	22
ns Falls, village	2,097	39	10	39	24	24	7
, town	3,346	26	6	33	18	3	.....
, village	923	19	2	17	15	17	13
illage	735	21	15	16	17	76	.....
, town	2,876	56	54	50	43	18	14
, village	3,134	43	54	52	44	39	30
wn	1,004	14	16	16	15	9	7
.....	62,658	1,118	1,129	1,130	1,056	553	493

Schenectady County

	Population.	Births.		Deaths.		Marriages.	
		1907.	1906.	1907.	1906.	1907.	1906.
rgh, town	2,467	41	30	27	37	17	12
town	2,012	16	25	35	39	5	5
, town	1,445	7	15	14	13	11	6
n, town	653	6	9	8	6	4	3
a, town	4,198	14	24	61	35	17	15
dy, city	58,387	2,097	1,722	1,029	901	713	623
lage	2,166	46	50	35	27	18	18
.....	71,328	2,227	1,875	1,209	1,058	775	682

Schoharie County

	Population.	Births.		Deaths.		Marriages.	
		1907.	1906.	1907.	1906.	1907.	1906.
Blenheim, town	701	21	11	9	11	5	5
Broome, town	1,054	18	7	17	17	5	5
Carlisle, town	1,091	13	13	12	21	1	5
Cobleskill, town	1,573	24	14	26	21	12	10
Cobleskill, village	2,158	23	23	26	44	26	22
Conesville, town	734	11	13	10	12	7	9
Esperance, town	773	8	5	12	6	5	4
Esperance, village	231	8	3	4	7	2	2
Fulton, town	1,611	24	28	37	21	9	7
Gilboa, town	1,425	26	21	25	22	5	5
Jefferson, town	1,304	24	20	18	28	17	5
Middleburgh, town	1,457	27	21	32	25	9	10
Middleburgh, village	1,209	18	7	21	14	20	6
Richmondville, town	950	22	10	18	13	1	.....
Richmondville, village	587	5	6	11	8	12	10
Schoharie, town	1,752	20	26	23	21	17	17
Schoharie, village	1,027	7	15	12	21	13	4
Seward, town	1,458	21	25	23	23	5	6
Sharon, town	1,467	25	24	17	22	6	2
Sharon Springs, village	526	4	9	12	11	6	6
Summit, town	1,146	14	20	17	21	7	13
Wright, town	1,060	18	12	13	17	6	4
Total	25,294	381	333	395	406	196	160

Schuyler County

	Population.	Births.		Deaths.		Marriages.	
		1907.	1906.	1907.	1906.	1907.	1906.
Burdette, village	378	6	6	8	8	5	1
Catherine, town	914	8	14	15	14	6	6
Cayuta, town	383	3	9	8	4	0	1
Dix, town	952	10	9	19	14	4	8
Hector, town	3,510	40	62	51	52	14	24
Montour, town	414	5	2	4	6	0	1
Montour Falls, village	1,236	18	16	29	15	17	18
Odessa, village	354	6	2	4	3	8	2
Orange, town	1,197	16	10	28	14	7	4
Reading, town	1,412	8	14	17	13	6	8
Tyrone, town	1,411	14	21	25	20	19	17
Watkins, village	2,957	41	48	65	44	94	51
Total	15,122	175	213	273	207	178	141

Seneca County

	Population.	Births.		Deaths.		Marriages.	
		1907.	1906.	1907.	1906.	1907.	1906.
own	1,237	23	23	14	19	8	3
town	2,718	44	37	36	20	10	10
n, village	717	7	5	14	9	9	5
own	908	15	16	13	9	1	3
m	1,540	25	25	18	23	7	7
m	1,444	13	18	17	13	0	8
age	577	3	4	11	11	5	7
, town	2,017	36	23	34	22	6	6
alls, town	811	5	8	1	13	0	.....
alls, village	6,733	158	124	115	123	65	58
m	808	13	23	15	19	3	9
own	1,196	29	22	25	14	1	3
, town	474	22	14	26	16	5	5
, village	4,123	75	72	71	76	47	40
l	25,315	468	414	410	387	167	164

Steuben County

	Population.	Births.		Deaths.		Marriages.	
		1907.	1906.	1907.	1906.	1907.	1906.
own	537	8	11	13	8	59	54
illage	2,027	15	17	24	23	29	40
wn	1,125	10	32	10	7	2	4
lage	1,026	13	12	13	17	13	13
n	2,794	39	32	69	58	20	15
ge	3,695	45	55	47	55	45	54
town	620	9	5	10	9	6	6
town	1,217	28	25	22	13	9	4
town	1,350	11	17	17	18	10	6
own	1,186	14	15	9	18	4	9
illage	1,985	35	32	34	43	39	43
n	1,215	9	6	16	16	10	21
town	2,158	37	38	21	30	8	11
village	826	16	10	14	12	14	8
own	2,212	39	43	33	23	12	18
ty	13,515	279	285	265	195	204	204
town	1,270	14	17	16	9	3	2
n	1,046	15	13	15	14	2	3
own	914	12	10	1	11	6	7
l, town	1,082	24	15	15	17	7	12
sport, village	1,141	15	19	22	20	18	14
town	664	13	14	12	8	3	1
own	940	12	14	12	11	2	3
le, town	1,942	10	21	28	31	12	7
ty	13,259	239	277	184	189	169	175
own	1,530	37	19	27	24	10	8
n	1,365	33	27	13	20	8	7
own	1,174	11	24	14	14	55	84
st, village	1,061	18	21	21	18	30	23
, town	1,204	20	17	15	8	2	1
, village	694	8	4	19	5	10	10
own	1,384	18	13	11	21	10	9
town	973	14	8	10	9	5	4
llage	596	10	4	11	7	10	5
town	927	14	15	5	18	7	2
g, town	1,725	45	32	22	23	33	28
town	1,070	15	12	16	13	10	12
wn	1,376	19	15	21	20	1	2
town	1,480	26	28	15	12	18	8
village	1,220	31	20	11	15	12	19
wn	682	5	12	9	9	4	3
n, town	1,011	24	22	11	7	13	11
own	1,006	15	19	11	9	6	7
town	1,226	18	18	23	20	8	8
village	342	7	5	5	10	5	3
.....	81,814	1,349	1,370	1,211	1,137	963	988

Suffolk County

	Population.	Births.		Deaths.		Marriages.	
		1907.	1906.	1907.	1906.	1907.	1906.
Amityville, village	2,429	16	11	36	65	9	10
Babylon, town	3,133	63	49	70	62	27	8
Babylon, village	2,357	39	41	21	37	24	26
Brookhaven, town	12,604	219	184	218	216	69	68
East Hampton, town	4,303	78	83	57	43	27	11
Greenport, village	2,667	78	86	37	38	35	14
Huntington, town	8,433	163	121	115	134	60	46
Islip, town	13,721	259	207	207	208	93	97
Northport, village	1,803	39	26	37	13	18	13
Patchogue, village	3,446	76	66	57	35	66	41
Riverhead, town	4,950	96	51	74	65	84	69
Sag Harbor, village	3,048	16	59	15	42	10	20
Shelter Island, town	1,105	15	14	9	14	5	4
Smithtown, town	3,325	57	70	68	46	21	21
Southampton, town	5,763	97	121	75	71	34	29
Southampton, village	2,213	56	51	24	19	11	11
Southold, town	6,322	96	89	78	55	35	25
Total	81,653	1,463	1,329	1,198	1,163	628	513

Sullivan County

	Population.	Births.		Deaths.		Marriages.	
		1907.	1906.	1907.	1906.	1907.	1906.
Bethel, town	2,154	34	41	27	31	13	9
Callicoon, town	2,026	34	28	39	34	8	18
Cochecton, town	1,123	12	17	24	19	13	12
Delaware, town	1,814	36	37	31	34	32	35
Fallsburgh, town	3,810	87	71	56	53	22	21
Forestburgh, town	544	7	10	10	4	6	5
Fremont, town	2,110	39	45	21	23	8	12
Highland, town	975	13	33	23	18	9	16
Liberty, town	3,359	44	43	80	86	16	11
Liberty, village	2,124	46	32	73	91	40	54
Lumberland, town	749	12	9	14	7	2	3
Mamakating, town	2,691	47	35	40	36	15	15
Monticello, village	1,388	45	33	54	46	19	19
Neversink, town	2,009	25	24	32	25	13	17
Rockland, town	3,714	43	71	52	44	36	35
Thompson, town	2,777	31	26	30	34	6	10
Tusten, town	907	17	14	14	15	4	3
Wurtsboro, village	508	6	12	15	12	8	5
Total	34,795	578	581	635	612	270	300

Tioga County

	Population.	Births.		Deaths.		Marriages.	
		1907.	1906.	1907.	1906.	1907.	1906.
Barton, town	1,744	12	18	20	27	9	6
Berkshire, town	919	12	12	17	12	12	6
Candor, town	2,346	34	27	26	33	20	9
Candor, village	802	8	10	23	22	10	12
Newark Valley, town	1,193	22	21	23	23	6	2
Newark Valley, village	909	17	14	13	7	5	8
Nichols, town	1,004	7	10	18	18	4	5
Nichols, village	452	1	2	5	5	24	30
Owego, town	2,994	36	44	58	42	25	18
Owego, village	5,010	55	70	102	91	69	58
Richford, town	1,001	21	11	19	10	9	9
Spencer, town	980	12	27	14	16	0	6
Spencer, village	618	15	9	9	15	15	11
Tioga, town	2,017	31	33	33	36	16	13
Waverly, village	4,915	85	71	78	78	278	255
Total	26,907	368	379	458	435	502	448

Tompkins County

	Population.	Births.		Deaths.		Marriages.	
		1907.	1906.	1907.	1906.	1907.	1906.
Caroline, town	1,704	36	15	23	25	15	10
Danby, town	1,246	16	19	37	19	8	7
Dryden, town	2,474	23	23	45	36	11	10
Dryden, village	749	10	12	9	10	10	7
Enfield, town	1,111	9	11	16	17	6	5
Freeville, village	493	8	2	4	1	6	6
Groton, town	2,022	29	23	32	43	8	6
Groton, village	1,188	9	13	15	11	12	11
Ithaca, town	1,573	11	5	25	16	2	6
Ithaca, city	14,615	231	219	244	207	180	166
Lansing, town	2,653	33	46	47	37	9	8
Newfield, town	1,338	13	13	15	16	6	5
Newfield, village	347	3	3	6	6	5	14
Trumansburg, village	1,202	10	13	23	19	26	15
Ulysses, town	1,428	11	22	21	20	6	8
Total	34,151	452	439	562	483	310	284

Ulster County

	Population.	Births.		Deaths.		Marriages.	
		1907.	1906.	1907.	1906.	1907.	1906.
Denning, town	688	9	7	8	6	2	2
Ellenville, village	2,872	50	27	51	55	30	42
Esopus, town	4,205	70	77	74	70	18	16
Gardiner, town	1,473	21	13	14	32	6	17
Hardenbergh, town	657	10	6	9	3	1	1
Hurley, town	1,677	15	18	27	31	15	11
Kingston, town	439	8	8	8	5	0	1
Kingston, city	25,556	760	677	479	473	290	272
Lloyd, town	2,722	30	55	44	40	13	6
Marbletown, town	2,988	26	39	52	37	22	24
Marlborough, town	3,917	65	58	60	44	38	20
Marlborough, village	.....	3	.....	3	.....	9	.....
New Paltz, town	1,192	14	30	39	40	1	5
New Paltz, village	970	10	15	23	28	10	11
Olive, town	2,347	51	35	48	34	31	25
Pine Hill, village	520	6	4	3	5	8	10
Plattekill, town	1,823	21	34	19	25	6	8
Rifton, village	581	15	12	7	8	3	3
Rochester, town	2,822	30	37	53	34	19	19
Rosendale, town	3,271	65	67	39	45	9	11
Rosendale, village	1,399	17	21	13	29	21	17
Saugerties, town	5,914	167	123	128	97	39	21
Saugerties, village	3,833	69	67	62	55	33	24
Shandaken, town	2,525	49	56	38	42	17	23
Shawangunk, town	2,467	52	43	39	26	15	23
Ulster, town	3,797	13	17	54	66	8	16
Wawarsing, town	4,343	58	82	51	65	41	32
Woodstock, town	1,665	21	31	31	30	11	6
Total	86,660	1,723	1,659	1,476	1,425	716	666

Warren County

	Population.	Births.		Deaths.		Marriages.	
		1907.	1906.	1907.	1906.	1907.	1906.
Bolton, town	1,561	21	17	21	17	4	6
Caldwell, town	845	15	17	23	15	4	5
Chester, town	1,965	44	20	50	44	17	17
Glens Falls, village	14,650	281	236	229	264	229	142
Hague, town	1,054	7	7	7	10	8	9
Horicon, town	1,114	15	14	8	11	6	7
Johnsburgh, town	2,364	43	33	36	41	26	23
Lake George, village	644	7	16	14	14	11	12
Luzerne, town	1,371	20	20	21	22	8	16
Queensbury, town	2,131	42	48	32	27	4	4
Stony Creek, town	910	13	20	9	8	7	7
Thurman, town	833	10	12	13	8	2	.....
Warrensburgh, town	2,483	43	37	42	36	32	23
Total	31,935	561	497	505	517	358	271

Washington County

	Population.	Births.		Deaths.		Marriages.	
		1907.	1906.	1907.	1906.	1907.	1906.
Argyle, town	1,575	14	23	40	36	16	16
Argyle, village	246	3	1	6	3	0	3
Cambridge, town	246	6	19	17	26	4	3
Cambridge, village	1,604	11	12	42	23	14	21
Dresden, town	620	9	6	17	9	4	2
Easton, town	2,210	33	351	33	17	6	7
Fort Ann, town	1,812	37	31	30	27	4	7
Fort Ann, village	438	7	3	9	5	13	10
Fort Edward, town	1,494	39	46	19	39	5	14
Fort Edward, village	3,806	83	57	72	58	41	34
Granville, town	2,623	35	37	37	34	18	23
Granville, village	3,864	179	62	63	57	48	99
Greenwich, town	2,342	35	29	35	35	10	3
Greenwich, village	1,996	24	28	47	33	33	26
Hampton, town	671	18	13	11	13	13	15
Hartford, town	1,270	16	14	27	21	13	5
Hebron, town	1,599	11	9	18	32	7	5
Jackson, town	1,052	8	13	16	12	0	2
Kingsbury, town	1,713	15	35	22	30	5	3
Putnam, town	507	9	7	4	3	2	3
Salem, town	1,489	29	17	28	31	13	22
Salem, village	1,313	18	12	28	20	15	10
Sandy Hill, village	5,321	80	185	78	65	77	77
White Creek, town	2,425	11	9	15	16	12	17
Whitehall, town	980	7	23	11	10	5	26
Whitehall, village	4,148	113	109	66	76	67	67
Total	47,376	850	1,151	790	731	445	520

Wayne County

	Population.	Births.		Deaths.		Marriages.	
		1907.	1906.	1907.	1906.	1907.	1906.
Arcadia, town	2,556	32	24	31	24	13	22
Butler, town	1,704	26	18	34	19	10	12
Clyde, village	2,552	60	47	43	54	42	28
Galen, town	1,908	23	24	25	24	3	5
Huron, town	1,592	24	24	21	21	11	8
Lyons, town	909	26	33	29	35	1	.....
Lyons, village	4,758	69	66	70	89	61	48
Macedon, town	1,938	38	39	25	27	13	8
Macedon, village	677	7	10	12	6	3	5
Marion, town	2,025	35	32	24	38	18	15
Newark, village	4,554	101	82	83	78	68	49

Wayne County — Continued

	Population.	Births.		Deaths.		Marriages.	
		1907.	1906.	1907.	1906.	1907.	1906.
Ontario, town	2,604	69	44	36	35	20	16
Palmyra, town	1,946	40	15	25	27	13	7
Palmyra, village	2,096	29	40	31	33	44	29
Red Creek, village	499	5	2	8	7	13	10
Rose, town	1,888	24	31	34	29	19	8
Savannah, town	1,138	13	21	13	16	7	5
Savannah, village	544	7	8	16	6	4	6
Sodus, town	4,997	57	60	87	73	38	36
Walworth, town	2,156	41	37	22	28	10	10
Williamson, town	2,912	55	49	45	49	24	34
Wolcott, town	1,312	24	32	29	23	5	9
Wolcott, village	1,294	17	14	18	15	18	16
Total	48,564	816	752	761	756	458	386

Westchester County

	Population.	Births.		Deaths.		Marriages.	
		1907.	1906.	1907.	1906.	1907.	1906.
Ardsley, village	470	13	10	5	2	4	2
Bedford, town	4,759	96	59	103	78	26	22
Briarcliff Manor, village	417	15	16	13	3	6	5
Bronxville, village	994	10	10	7	17	6	8
Cortlandt, town	6,230	101	107	77	81	32	24
Croton-on-Hudson, village	1,599	38	47	24	28	12	17
Dobbs Ferry, village	3,515	71	81	55	66	7	16
Eastchester, town	1,412	42	21	22	27	14	9
Greenburgh, town	3,740	51	41	62	46	12	14
Harrison, town	2,922	61	52	94	54	15	8
Hastings-on-Hudson, vil'ge	3,060	62	63	52	55	10	13
Irvington, village	2,480	44	45	23	27	20	19
Larchmont, village	1,760	13	16	13	13	11	9
Lewisboro, town	1,542	20	19	24	22	3	15
Mamaroneck, town	*5,653	4	7	14	18	0	1
Mamaroneck, village	5,090	110	84	87	80	46	59
Mt. Kisco, village	1,830	50	25	19	38	30	19
Mount Pleasant, town	3,393	68	45	228	129	8	8
Mount Vernon, city	25,006	**1,630	603	400	402	545	769
New Castle, town	1,126	38	27	35	29	4	8
New Rochelle, city	20,480	697	448	338	346	242	209
North Castle, town	1,483	19	25	25	17	9	6
North Pelham, village	850	11	11	12	12	3	.....
North Salem, town	1,169	16	9	17	21	14	14
North Tarrytown, village	4,750	66	42	78	78	57	39
Ossining, town	2,764	5	25	9	26	0	3
Ossining, village	7,135	180	165	179	159	106	68
Peekskill, village	13,200	292	246	233	248	102	107
Pelham, town	†1,841	8	2	0	3	3	.....
Pelham, village	349	6	5	9	7	0	.....
Pelham Manor, village	638	2	2	5	4	2	3
Pleasantville, village	1,585	40	22	31	20	23	18
Portchester, village	11,198	225	170	204	180	256	312
Poundridge, town	798	4	4	19	18	8	9
Rye, town	2,803	8	6	9	6	1	4
Rye, village	4,076	49	61	57	46	30	40
Scarsdale, town	1,018	14	17	9	11	10	1
Somers, town	1,175	24	16	18	24	12	10
Tarrytown, village	5,370	112	50	98	74	34	36
Tuckahoe, village	1,580	103	67	35	28	3	2
White Plains, town	550	4	2	3	8	0	.....
White Plains, village	11,579	344	262	231	215	139	136
Yonkers, city	61,716	1,473	1,554	1,068	1,095	752	691
Yorktown, town	2,294	34	41	34	37	33	13
Total	228,950	6,273	4,630	4,058	3,898	2,650	2,766

*Includes population of villages of Mamaroneck and Larchmont.
†Includes population of villages of Pelham and North Pelham.
**Included 948 delayed returns.

Wyoming County

	Population.	Births.		Deaths.		Marriages.	
		1907.	1906.	1907.	1906.	1907.	1906.
Arcade, town	887	14	9	14	9	4	4
Arcade, village	1,052	15	14	22	12	17	12
Attica, town	905	13	11	15	14	0	1
Attica, village	1,816	26	32	30	32	40	27
Bennington, town	1,861	26	21	33	31	19	12
Castile, town	1,386	18	12	15	10	8	1
Castile, village	1,000	13	8	24	22	15	13
Covington, town	957	23	4	10	17	2	5
Eagle, town	1,152	12	19	11	21	2	6
Gainesville, town	1,412	19	24	19	16	6	3
Gainesville, village	309	6	4	6	4	6	.....
Genesee Falls, town	633	7	3	12	13	6	1
Java, town	1,663	25	18	22	25	11	12
Middlebury, town	1,378	13	15	24	16	18	13
Orangeville, town	890	14	12	17	23	4	4
Perry, town	1,160	22	29	16	26	8	10
Perry, village	3,749	67	71	64	41	68	48
Pike, town	774	11	13	13	10	1	1
Pike, village	457	6	5	6	15	4	2
Sheldon, town	1,742	32	38	14	20	12	19
Silver Springs, village	817	23	13	10	11	19	8
Warsaw, town	1,273	19	17	5	10	4	2
Warsaw, village	3,196	37	48	37	47	22	35
Wethersfield, town	869	9	18	6	11	2	7
Total	31,355	470	458	450	456	298	259

Yates County

	Population.	Births.		Deaths.		Marriages.	
		1907.	1906.	1907.	1906.	1907.	1906.
Barrington, town	1,119	9	1	12	5	7	4
Benton, town	2,137	26	22	25	26	10	5
Dresden, village	321	9	2	11	4	1	7
Dundee, village	1,282	6	20	14	12	12	12
Italy, town	897	13	14	5	8	6	4
Jerusalem, town	2,554	28	15	42	38	11	10
Middlesex, town	1,202	19	20	17	21	8	3
Milo, town	1,579	24	22	25	12	14	5
Penn Yan, village	4,504	22	34	91	90	52	57
Potter, town	*1,568	20	24	5	14	12	8
Rushville, village	†500	7	7	15	13	4	5
Starkey, town	1,560	17	7	38	11	6	3
Torrey, town	680	12	18	9	10	2	1
Total	19,408	212	206	309	264	145	124

*Part of village in Ontario county.
†Including population of village of Rushville in county of Yates.

Total Registration in the State Since 1885

The following table shows the total births, marriages and deaths reported in the State since 1885, and the birth, marriage and death rate per 1,000 population.

The statistics for the earlier years are incomplete, as but little interest was shown in the registration of vital statistics by many local boards of health in the rural districts.

The figures for the estimated population used throughout this section have been taken from a table prepared by Professor Walter F. Willcox, consulting statistician of the Department, in accordance with a method explained in the following section of this report.

Total Registration Since 1885

YEAR.	Population.	Births.	Deaths.	Marriages.	Birth Rate.	Death Rate.	Marriage Rate.
1885	5,609,910	63,536	80,407	24,409	11.3	14.3	4.4
1886	5,719,855	89,828	86,801	36,764	15.7	15.2	6.4
1887	5,831,947	102,038	108,269	44,438	17.5	18.6	7.6
1888	5,946,246	103,089	114,584	43,683	17.3	19.3	7.3
1889	6,062,764	114,804	113,155	50,960	18.8	18.6	8.4
1890	6,182,600	112,572	128,648	41,195	18.2	20.8	6.7
1891	6,316,333	125,909	129,850	51,458	19.9	20.5	8.1
1892	6,438,283	130,143	131,388	52,725	20.2	20.3	8.1
1893	6,537,716	136,297	129,659	52,805	20.8	19.7	8.1
1894	6,638,696	141,827	123,423	52,539	21.4	18.6	7.9
1895	6,741,246	142,311	128,834	59,059	21.1	19.1	8.7
1896	6,845,375	147,327	126,253	58,990	21.5	18.4	8.6
1897	6,951,111	144,631	118,525	57,530	20.8	17.1	8.3
1898	7,058,459	138,702	122,584	57,392	19.7	17.4	8.1
1899	7,167,491	136,778	121,831	61,167	19.1	17.0	8.5
1900	7,281,533	143,156	132,352	63,225	19.7	18.2	8.7
1901	7,434,896	140,539	131,461	65,216	18.9	17.7	8.8
1902	7,591,491	146,740	124,657	68,903	19.3	16.4	9.1
1903	7,751,375	158,343	127,602	73,011	20.4	16.4	9.4
1904	7,914,636	165,014	142,014	74,677	20.8	17.8	9.4
1905	8,081,333	172,259	137,222	78,261	21.3	17.0	9.7
1906	8,251,538	183,012	140,773	87,870	22.2	17.1	10.7
1907	8,425,333	196,020	147,890	95,216	23.3	17.6	11.3

Summary of Mortality for Year

During the year 1907 the reports of 147,890 deaths were received at the State Department of Health. Based upon an estimated population of 8,425,333, the mortality rate per 1,000 of population was 17.5. In 1906 it was 17.1 and the average for five years past was 17.2.

Deaths under 1 year were 28,011; from 1 to 5 years, 12,157; from 5 to 10 years, 3,260; from 10 to 20 years, 5,220; from 20 to 40 years, 24,901; from 40 to 60 years, 29,583; from 60 to 80

SUMMARY OF MORTALITY OF THE STATE OF NEW YORK FOR THE YEAR 1907, AS PUBLISHED IN THE MONTHLY BULLETIN.

Total Mortality by Months.

1907.	Total deaths.	Rate per 1,000 of population.	Ages.			Epidemic Diseases.									
			Deaths under 1 year of age.	Deaths 1 to 5 years of age.	Deaths at 60 years and over.	Typhoid fever.	Malarial diseases.	Smallpox.	Measles.	Scarlatina.	Whooping cough.	Diphtheria and croup.	Influenza.	Erysipelas.	Cerebro-spinal meningitis.
January	13,620	19.3	1,988	1,023	4,608	122	4	1	53	66	68	283	476	55	19
February	13,093	18.6	2,032	1,054	4,559	114	8	.....	44	85	63	272	618	64	22
March	13,765	19.6	2,246	1,049	4,475	117	8	.....	72	114	85	255	448	69	22
April	12,447	17.7	2,023	970	3,922	125	8	2	83	115	81	219	209	54	25
May	11,894	16.9	1,841	1,015	3,580	99	7	1	118	112	87	214	98	49	22
June	10,903	15.5	1,770	967	3,203	69	12	3	168	141	75	226	64	55	16
July	11,959	17.0	3,361	1,178	2,805	100	14	1	143	89	62	190	17	28	17
August	13,429	19.1	4,098	1,480	2,965	149	22	.....	70	42	121	163	20	18	12
September	11,485	16.4	2,928	1,027	2,886	189	15	1	25	35	49	140	15	13	17
October	11,383	16.2	2,221	820	3,483	224	16	.....	34	44	39	195	37	15	18
November	10,756	15.3	1,573	671	3,529	190	14	.....	47	71	23	200	51	29	23
December	12,708	18.1	1,876	888	4,339	170	8	1	138	115	35	243	319	34	12
Delayed returns	*448	.....	54	15	238	5	.....	.....	2	3	1	3	14	.....	5
*Grand total	147,890	17.5	28,011	12,157	44,592	1,673	136	10	997	1,032	789	2,603	2,386	483	230
Average for five years past	133,747	17.2	25,950	12,857	24,803	1,551	144	102	1,035	976	765	2,784	.....	392	1,272
Totals for 1906	140,343	17.1	27,114	12,176	32,734	1,568	139	7	1,369	690	821	2,691	182	452	1,178

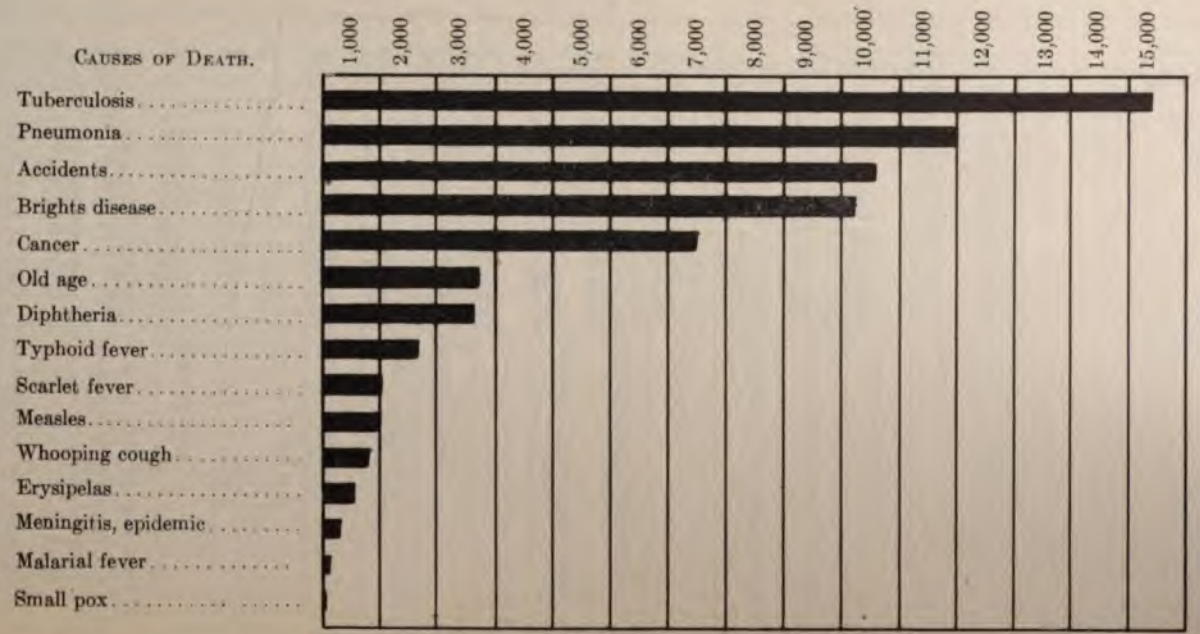
* This includes returns of deaths occurring in 1907 received after publication of December statistics.

Diseases of the skin showed an increased mortality, raising a total of 379 for 1906 to 701.

There was also a very large increase in the malformations responsible for death, from 497 in 1906 to 1,138 in 1907; and deaths under three months increased from 4,606 in 1906 to 7,025 in 1907.

Deaths from violence or external causes numbered 9,668 as against 8,874 last year. Included in this total are suicides, 1,207; fractures, 659; burns and scalds, 738; heat and sunstroke, 92; exposure to cold, 45; electric shock, 85; drowning, 967; poisonous gases, 506; accidental poisoning, 293; accidental gunshot wounds, 120; railroad injuries, 1,425; injuries by machinery and in mines and quarries, 207; homicides, 382.

DIAGRAM SHOWING THE COMPARATIVE NUMBER OF DEATHS FROM FIFTEEN PROMINENT CAUSES IN NEW YORK STATE, 1907.



	44	14	17	18	15	11	10	15	18	13	12	13	
General tuberculosis	.....	1	.....	.....	.....	.....	.....	.....	2	.....	.....	.....	200
Scrofula													3
Syphilis	42	38	38	42	44	51	32	49	44	50	37	41	508
Gonorrhea of the adult	3	.....	2	.....	2	2	1	.....	3	2	1	1	17
Gonorrheal infections of children	.....	3	4	.....	3	1	1	1	5	.....	.....	.....	18
Cancer of mouth	16	19	37	17	15	15	21	17	15	9	11	14	206
Cancer of stomach and liver	181	175	199	205	183	178	189	231	242	203	206	204	2,396
Cancer of intestines and peritoneum	65	53	27	68	61	77	79	63	65	87	60	57	812
Cancer of female genital organs	87	76	94	65	81	65	80	81	69	70	82	96	946
Cancer of breast	41	52	63	48	49	34	43	54	47	54	67	65	617
Cancer of skin	22	19	16	10	22	18	19	24	18	7	12	14	201
Cancer of other or unspecified organs†	115	97	100	101	93	104	84	100	116	117	93	102	*1,242
Tumor (noncancerous)†	11	9	16	5	8	15	10	23	9	19	21	17	163
Acute articular rheumatism	50	44	62	67	61	58	49	40	33	31	33	35	563
Chronic rheumatism and gout	27	52	61	56	65	42	33	40	47	49	43	51	566
Scurvy	.....	1	1	1	1	4	1	1	1	2	2	1	16
Diabetes	116	115	99	110	84	94	96	106	91	96	112	115	1,234
Exophthalmic goiter	10	8	5	6	12	6	11	5	9	9	7	6	94
Addison's disease	5	1	5	2	.....	5	4	4	1	4	1	.....	32
Leukemia	15	8	11	10	9	10	13	16	16	13	10	7	138
Anemia chlorosis†	39	32	35	45	39	39	32	30	31	33	29	39	423
Alcoholism	103	64	66	73	55	77	81	107	105	88	108	96	1,023
Lead poisoning	2	1	1	2	.....	1	3	2	.....	.....	1	2	15
Other professional intoxications	.....	.....	.....	.....	1	.....	1	.....	.....	.....	.....	.....	2
Other chronic poisonings	4	1	1	.....	2	1	1	4	3	1	.....	2	20
II. Nervous System.													
Encephalitis†	1	7	1	1	3	7	4	6	4	3	6	1	44
Meningitis	189	172	243	227	273	175	199	192	195	159	128	127	*2,284
Locomotor ataxia	24	13	17	21	16	19	28	17	17	14	12	16	214
Other diseases of spinal cord	39	32	47	40	38	29	42	54	56	61	47	41	526
Apoplexy	627	688	668	610	613	542	465	552	484	614	610	662	7,135
Softening of the brain	60	27	16	14	14	15	8	22	17	17	18	17	245
Paralysis†	108	125	119	89	126	113	106	92	98	112	96	106	1,282
General paralysis of the insane	57	34	56	41	27	27	41	30	23	30	45	51	462
Other forms of mental disease	7	16	10	28	18	16	13	11	15	5	10	14	163
Other diseases of brain	4	4	13	18	5	6	4	5	5	1	2	3	70
Epilepsy	28	30	26	31	27	20	29	31	35	33	28	30	348
Convulsions (nonpuerperal)†	.....	1	8	1	1	2	2	4	.....	.....	1	1	21
Convulsions of children†	85	109	109	105	99	84	83	87	74	71	59	77	1,042
Tetanus	11	6	9	5	10	13	17	12	11	12	14	8	128
Chorea	1	3	1	.....	2	2	2	1	1	1	3	3	20
Other diseases of nervous system	63	37	51	32	42	34	23	28	51	36	43	25	465
Diseases of the eye and its adnexa	.....	2	.....	1	3	.....	.....	.....	.....	.....	.....	.....	6
Diseases of the ear	24	18	28	31	28	21	9	20	20	12	14	18	243

* These totals have been increased by delayed returns which were received after publication of December returns and which it has not been practicable to classify under month to which they belonged.

† Indefinite and unsatisfactory titles.

CAUSES OF DEATH.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
III. CIRCULATORY SYSTEM.													
Pericarditis	24	17	22	14	19	12	11	14	8	7	12	17	177
Endocarditis	340	170	124	177	136	95	139	125	109	141	140	156	1,852
Heart disease	1,039	1,057	1,145	1,027	1,084	962	897	844	854	1,005	990	1,168	12,072
Angina pectoris	61	40	46	48	56	46	29	45	29	38	36	55	529
Diseases of arteries	129	118	112	112	115	111	116	109	95	86	104	131	1,338
Embolism and thrombosis	37	44	56	49	35	49	31	32	37	47	36	47	500
Diseases of veins	7	7	4	2	3	8	5	15	12	6	11	6	86
Diseases of lymphatics	1		5	1	4	2	1	1		2	3	3	23
Hemorrhages (except of lungs)†	17	21	18	16	18	14	7	13	12	16	12	9	173
Other diseases of circulatory system	33	3	12	23	4	21	3	10	16	.....	6	13	144
IV. RESPIRATORY SYSTEM.													
Diseases of nasal fossæ†			2	1	1	.....	.....	1	2	.....	.....	.....	7
(*a*) Laryngitis	15	7	6	6	7	3	4	3	2	4	4	4	65
(*b*) Other diseases of larynx	3	10	12	8	7	8	4	.....	4	.....	6	6	68
Diseases of the thyroid body	2	2		1	1	2	.....	.....	.....	.....	.....	.....	8
Acute bronchitis	230	229	183	155	149	86	84	69	76	89	118	149	1,617
Chronic bronchitis	140	130	133	112	100	75	44	43	55	58	70	98	1,058
Bronchopneumonia	857	835	779	654	568	513	390	442	332	396	535	789	7,090
Pneumonia	1,554	1,465	1,433	1,185	974	611	338	355	385	586	838	1,266	*11,014
Pleurisy	49	49	52	36	34	38	38	27	31	30	34	41	450
Congestion of lungs†	53	55	71	55	30	38	19	23	26	35	37	44	486
Gangrene of lungs	4	1	8	6	5	2	2	.....	2	3	1	6	40
Asthma	37	28	25	22	23	16	13	16	16	11	20	31	258
Emphysema	20	14	16	12	10	9	5	5	6	8	8	21	134
(*a*) Hemorrhage of lungs	3	1	1	4	2	3	6	5	4	2	3	1	35
(*b*) Other diseases of respiratory system	52	52	46	36	10	29	14	13	20	8	10	25	315
V. DIGESTIVE SYSTEM.													
Diseases of mouth	.....	5	.....	1	2	1	2	3	2	1	1	.....	18
(*a*) Tonsilitis	1	2	6	5	4	7	5	2	5	.....	1	1	39
(*b*) Diseases of pharynx	9	10	12	5	13	5	5	7	8	9	6	16	105
Diseases of esophagus	3	2	2	2	5	2	4	.....	2	1	2	2	27
Ulcer of stomach	27	25	21	19	28	22	23	21	27	37	25	24	299
(*a*) Gastritis†	35	24	50	35	34	44	31	71	44	46	30	40	434
(*b*) Other diseases of stomach	70	65	85	77	71	64	74	55	121	99	64	66	911
Dentition†	.....	1	.....	.....	1	.....	1	3	.....	1	1	.....	8
Diarrhea and enteritis (under 2 years)	213	206	304	279	287	308	1,698	2,275	1,314	742	242	226	*8,102
Diarrhea and enteritis (2 years and over)	67	75	80	73	72	78	174	306	267	168	91	62	1,515
Intestinal parasites	1	1	1	2	.....	.....	1	1	.....	.....	.....	1	8

	44	14	17	18	15	11	10	15	18	13	12	13	200
General tuberculosis	.....	1	.....	.....	.....	.....	.....	.....	2	.....	.....	.....	3
Scrofula	42	38	38	42	44	51	32	49	44	50	37	41	508
Syphilis	3	.....	2	.....	2	2	1	.....	3	2	1	1	17
Gonorrhea of the adult	.....	3	4	.....	3	1	1	1	5	.....	.....	.....	18
Gonorrheal infections of children	16	19	37	17	15	15	21	17	15	9	11	14	206
Cancer of mouth	181	175	199	205	183	178	189	231	242	203	206	204	2,396
Cancer of stomach and liver	65	53	27	68	61	77	79	63	65	87	60	57	812
Cancer of intestines and peritoneum	87	76	94	65	81	65	80	81	69	70	82	96	946
Cancer of female genital organs	41	52	63	48	49	34	43	54	47	54	67	65	617
Cancer of breast	22	19	16	10	22	18	19	24	18	7	12	14	201
Cancer of skin	115	97	100	101	93	104	84	100	116	117	93	102	*1,242
Cancer of other or unspecified organs†	11	9	16	5	8	15	10	23	9	19	21	17	163
Tumor (noncancerous)†	50	44	62	67	61	58	49	40	33	31	33	35	563
Acute articular rheumatism	27	52	61	56	65	42	33	40	47	49	43	51	566
Chronic rheumatism and gout	.....	1	1	1	1	4	1	1	1	2	2	1	16
Scurvy	116	115	99	110	84	94	96	106	91	96	112	115	1,234
Diabetes	10	8	5	6	12	6	11	5	9	9	7	6	94
Exophthalmic goiter	5	1	5	2	.....	5	4	4	1	4	1	.....	32
Addison's disease	15	8	11	10	9	10	13	16	16	13	10	7	138
Leukemia	39	32	35	45	39	39	32	30	31	33	29	39	423
Anemia chlorosis†	103	64	66	73	55	77	81	107	105	88	108	96	1,023
Alcoholism	2	1	1	2	.....	1	3	2	.....	.....	1	2	15
Lead poisoning	.....	.....	.....	.....	1	.....	1	.....	.....	.....	.....	.....	2
Other professional intoxications	4	1	1	.....	2	1	1	4	3	1	.....	2	20
Other chronic poisonings													
II. NERVOUS SYSTEM.													
Encephalitis†	1	7	1	1	3	7	4	6	4	3	6	1	44
Meningitis	189	172	243	227	273	175	190	192	195	159	128	127	*2,284
Locomotor ataxia	24	13	17	21	16	19	28	17	17	14	12	16	214
Other diseases of spinal cord	39	32	47	40	38	29	42	54	56	61	47	41	526
Apoplexy	627	688	668	610	613	542	465	552	484	614	610	662	7,135
Softening of the brain	60	27	16	14	14	15	8	22	17	17	18	17	245
Paralysis†	108	125	119	89	126	113	106	92	98	112	96	106	1,282
General paralysis of the insane	57	34	56	41	27	27	41	30	23	30	45	51	462
Other forms of mental disease	7	16	10	28	18	16	13	11	15	5	10	14	163
Other diseases of brain	4	4	13	18	5	6	4	5	5	1	2	3	70
Epilepsy	28	30	26	31	27	20	29	31	35	33	28	30	348
Convulsions (nonpuerperal)†	.....	1	8	1	1	2	2	4	.....	.....	1	1	21
Convulsions of children†	85	109	109	105	99	84	83	87	74	71	59	77	1,042
Tetanus	11	6	9	5	10	13	17	12	11	12	14	8	128
Chorea	1	3	1	.....	2	2	2	1	1	1	3	3	20
Other diseases of nervous system	63	37	51	32	42	34	23	28	51	36	43	25	465
Diseases of the eye and its adnexa	.....	2	.....	1	3	.....	.....	.....	.....	.....	.....	.....	6
Diseases of the ear	24	18	28	31	28	21	9	20	20	12	14	18	243

* These totals have been increased by delayed returns which were received after publication of December returns and which it has not been practicable to classify under month to which they belonged.

† Indefinite and unsatisfactory titles.

CAUSES OF DEATH.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
III. CIRCULATORY SYSTEM.													
Pericarditis	24	17	22	14	19	12	11	14	8	7	12	17	177
Endocarditis	340	170	124	177	136	95	139	125	109	141	140	156	1,852
Heart disease	1,039	1,057	1,145	1,027	1,084	962	897	844	854	1,005	990	1,168	12,072
Angina pectoris	61	40	46	48	56	46	29	45	29	38	36	55	529
Diseases of arteries	129	118	112	112	115	111	116	109	95	86	104	131	1,338
Embolism and thrombosis	37	44	56	49	35	49	31	32	37	47	36	47	500
Diseases of veins	7	7	4	2	3	8	5	15	12	6	11	6	86
Diseases of lymphatics	1	.....	5	1	4	2	1	1	.....	2	3	3	23
Hemorrhages (except of lungs)†	17	21	18	16	18	14	7	13	12	16	12	9	173
Other diseases of circulatory system	33	3	12	23	4	21	3	10	16	.....	6	13	144
IV. RESPIRATORY SYSTEM.													
Diseases of nasal fossæ†	.....	.....	2	1	1	.....	.....	1	2	.....	.....	.....	7
(*a*) Laryngitis	15	7	6	6	7	3	4	3	2	4	4	4	65
(*b*) Other diseases of larynx	3	10	12	8	7	8	4	.....	4	.....	6	6	68
Diseases of the thyroid body	2	2	.....	1	1	2	.....	.....	.....	.....	.....	.....	8
Acute bronchitis	230	229	183	155	149	86	84	69	76	89	118	149	1,617
Chronic bronchitis	140	130	133	112	100	75	44	43	55	58	70	98	1,058
Bronchopneumonia	857	835	779	654	568	513	390	442	332	396	535	789	7,090
Pneumonia	1,554	1,465	1,433	1,185	974	611	338	355	385	586	838	1,266	*11,014
Pleurisy	40	49	52	36	34	38	38	27	31	30	34	41	450
Congestion of lungs†	53	55	71	55	30	38	19	23	26	35	37	44	486
Gangrene of lungs	4	1	8	6	5	2	2	.....	2	3	1	6	40
Asthma	37	28	25	22	23	16	13	16	16	11	20	31	258
Emphysema	20	14	16	12	10	9	5	5	6	8	8	21	134
(*a*) Hemorrhage of lungs	3	1	1	4	2	3	6	5	4	2	3	1	35
(*b*) Other diseases of respiratory system	52	52	46	36	10	29	14	13	20	8	10	25	315
V. DIGESTIVE SYSTEM.													
Diseases of mouth	.....	5	.....	1	2	1	2	3	2	1	1	.....	18
(*a*) Tonsilitis	1	2	6	5	4	7	5	2	5	.....	1	1	39
(*b*) Diseases of pharynx	9	10	12	5	13	5	5	7	8	9	6	16	105
Diseases of esophagus	3	2	2	2	5	2	4	.....	2	1	2	2	27
Ulcer of stomach	27	25	21	19	28	22	23	21	27	37	25	24	299
(*a*) Gastritis†	35	24	50	35	34	44	31	71	44	46	30	40	494

(a) Hernia	79	58	66	75	62	54	62	46	69	64	79	69	774
(b) Obstruction of intestines	40	34	34	32	39	22	20	29	37	29	27	25	375
Other diseases of intestines	35	24	12	16	19	23	59	22	41	25	20	19	315
Acute yellow atrophy of liver	1	2	.....	4	1	2	1	4	6	2	2	7	32
Hydatid tumors of liver	1	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	1	3
Cirrhosis of liver	157	132	150	132	146	126	154	134	128	162	131	147	1,692
Biliary calculi	16	15	27	23	24	25	10	26	11	20	16	16	229
Other diseases of liver	42	34	39	31	28	25	42	22	32	35	31	29	390
Diseases of spleen	.....	2	2	2	3	1	.....	.....	1	1	.....	.....	12
Peritonitis (nonpuerperal)	47	51	64	57	52	52	41	45	46	50	46	34	585
Appendicitis	77	63	75	74	63	88	94	90	70	65	58	65	882
Other diseases of digestive system	42	13	26	22	8	24	6	93	36	3	7	10	290
VI. GENITO-URINARY SYSTEM.													
Acute nephritis	147	100	128	123	100	87	106	110	99	108	102	121	1,331
Bright's disease	784	828	823	813	807	764	705	721	653	743	739	831	*9,244
Other diseases of kidneys	37	31	30	16	21	40	24	19	23	26	25	30	322
Calculi of urinary tract	1	5	3	5	3	2	1	2	1	4	3	1	31
Diseases of bladder	43	28	36	48	24	25	35	34	31	26	34	31	395
Diseases of urethra, urinary abscess, etc	2	3	7	5	2	5	2	3	5	3	1	5	43
Diseases of prostate	20	19	10	19	13	18	26	16	18	21	18	19	217
Nonvenereal diseases of (male) genital organs	.....	.....	2	.....	.....	2	.....	.....	.....	.....	2	2	8
Metritis	.....	4	2	.....	2	3	.....	1	5	.....	1	3	21
Uterine hemorrhage (nonpuerperal)	1	2	1	3	1	2	2	1	.....	1	.....	1	15
Uterine tumor (noncancerous)	11	14	8	20	18	14	15	9	16	12	12	5	154
Other diseases of uterus	2	5	13	12	4	7	7	9	5	2	3	8	77
Ovarian tumors	7	16	9	8	14	10	7	17	12	8	8	8	124
Diseases of tubes	1	3	2	.....	.....	.....	.....	5	.....	3	2	8	24
Other diseases of female genital organs	9	14	11	8	14	18	20	5	8	8	13	15	143
Nonpuerperal diseases of the breast (cancer excepted)	2	1	.....	1	.....	.....	.....	.....	3	1	.....	1	9
VII. CHILDBIRTH.													
Accidents of pregnancy	20	23	19	10	17	6	23	27	19	24	17	18	223
Puerperal hemorrhage	6	7	16	6	7	5	13	9	16	8	10	12	115
Other accidents of labor	8	20	7	23	14	9	10	16	7	15	9	11	149
Puerperal septicemia	48	36	69	66	61	49	35	32	28	31	34	49	538
Puerperal convulsions	24	28	29	27	27	25	23	31	15	19	23	24	295
Puerperal phlegmasia alba dolens	1	.....	3	.....	1	.....	.....	.....	.....	.....	.....	.....	5
Other puerperal accidents	6	5	20	14	9	10	2	3	6	4	1	3	83
Puerperal diseases of the breast	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	.....	2
VIII. DISEASES OF THE SKIN.													
Gangrene	37	27	38	42	42	32	26	36	32	34	34	39	419
Carbuncle	4	.....	2	1	4	5	5	.....	4	5	3	3	36
Abscess†	19	13	19	24	21	22	8	8	8	6	3	7	158
Other diseases of the skin	13	8	4	4	6	7	6	2	13	4	11	8	86

* these totals have been increased by delayed returns which were received after publication of December returns and which it has not been practicable to classify under month to which they belonged.

†Indefinite and unsatisfactory titles.

DEATHS BY CAUSES 1885 TO DATE.

YEAR.	All deaths.	Death rate.	Deaths under five years of age.	EPIDEMIC DISEASES.									
				Cerebro-spinal meningitis	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhea.
1885	80,407	14.3	30,027	446	067	944	33	1,184	1,170	354	834	4,508	7,301
1886	86,801	15.2	32,928	572	169	899	39	1,011	895	357	1,244	5,597	7,028
1887	108,269	18.6	35,114	540	327	935	175	1,267	1,205	327	447	6,490	9,258
1888	114,584	19.3	38,345	490	483	813	212	2,452	944	342	994	6,448	8,774
1889	113,155	18.6	40,243	402	550	746	30	2,205	899	293	1,303	5,855	8,294
1890	128,648	20.8	37,392	474	612	738	4	913	1,161	312	1,156	4,915	8,468
1891	129,850	20.5	42,740	589	926	619	4	2,252	1,200	367	825	5,072	9,179
1892	131,388	20.3	42,434	649	664	613	143	2,177	1,350	477	921	5,918	9,185
1893	129,659	19.7	41,643	875	685	493	252	1,626	789	366	1,203	5,947	9,056
1894	123,423	18.6	41,472	489	640	422	308	1,227	900	331	1,020	6,592	8,956
1895	128,834	19.1	42,002	546	7 6	409	11	850	1,266	370	1,169	4,989	9,055
1896	126,253	18.4	40,136	510	542	449	3	759	1,495	340	996	4,597	8,776
1897	118,525	17.1	35,771	538	351	380	27	841	873	303	825	4,115	7,267
1898	122,584	17.4	37,113	695	810	404	1	837	838	237	1,155	2,612	8,499
1899	121,831	17.0	35,386	702	604	248	21	730	756	353	886	2,786	6,480
1900	132,352	18.2	39,204	531	948	309	14	689	1,333	466	1,020	3,306	7,959
1901	131,461	17.7	35,775	492	741	283	445	1,430	859	363	721	3,026	9,337
1902	124,657	16.4	31,215	456	318	189	442	1,215	929	314	923	2,859	8,315
1903	127,602	16.4	32,768	454	665	137	41	1,057	721	354	811	3,035	7,480
1904	142,014	17.8	39,086	1,708	652	149	13	1,194	1,170	430	426	3,041	8,329
1905	137,222	17.0	38,045	2,566	554	106	9	726	988	415	847	2,296	8,955
1906	140,773	17.1	39,292	1,178	568	139	7	690	1,369	452	821	2,691	8,578
1907	147,890	17.6	40,168	230	673	136	10	1,032	997	483	789	2,603	9,213

Drowning	28	19	37	51	111	143	193	164	79	65	39	38	967
Starvation, privation, *etc*	.....	.....	1	.....	.....	.....	.....	1	.....	3	1	.....	6
Inhalation of poisonous gases	63	65	52	45	60	33	13	22	22	40	43	58	506
Other accidental poisonings	16	16	27	34	22	24	18	28	36	25	29	18	293
Accidental gunshot wounds	5	.....	14	4	6	6	15	14	13	13	21	9	120
Injuries by machinery	28	21	15	22	4	11	22	12	9	13	12	7	176
Injuries in mines and quarries	3	.....	.....	2	3	.....	8	5	2	1	1	6	31
Railroad accidents and injuries	107	117	103	102	119	135	109	128	151	112	120	122	1,425
Injuries by horses and vehicles	27	12	20	41	46	51	49	44	48	54	46	36	474
Other accidental traumatisms	138	134	102	120	95	159	176	156	140	156	122	112	1,610
Suffocation	18	13	10	6	14	10	3	6	4	12	14	13	123
Injuries at birth	32	28	26	36	31	40	20	36	34	31	40	42	396
Homicide	33	26	28	25	19	27	45	45	29	35	39	31	382
Other external violence	29	34	27	18	49	25	12	18	23	4	20	12	271
Opium habit	1	2	1	.....	1	1	1	3	2	.....	1	.....	13
XIV. Ill-Defined Diseases.													
Dropsy†	.....	4	4	6	3	2	2	5	5	2	3	7	43
Sudden death†	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Heart failure	.....	.....	.....	.....	6	8	1	2	4	3	2	5	31
Inanition	.....	1	5	5	1	40	5	11	7	2	5	2	84
Debility (over 3 months)	.....	.....	1	.....	.....	2	71	1	1	.....	.....	.....	76
Marasmus	4	6	15	6	16	5	5	38	42	41	23	8	209
Fever	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other ill-defined diseases	71	35	62	46	104	7	19	145	46	157	98	109	899
Unknown	1	3	10	6	4	.....	.....	5	71	.....	1	5	106
Total	13,620	13,093	13,765	12,447	11,894	10,903	11,959	13,429	11,485	11,383	10,756	12,708	*147,890

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† Indefinite and unsatisfactory titles.

DEATHS BY CAUSES 1885 TO DATE.

YEAR.	All deaths.	Death rate.	Deaths under five years of age.	EPIDEMIC DISEASES.									
				Cerebro-spinal menin-gitis	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysip-elas.	Whoop-ing cough.	Croup and diph-theria.	Diar-rhea.
1885	80,407	14.3	30,027	446	1,067	944	33	1,184	1,170	354	834	4,508	7,301
1886	86,801	15.2	32,928	572	1,169	899	39	1,011	895	357	1,244	5,597	7,028
1887	108,269	18.6	35,114	540	1,327	935	175	1,267	1,205	327	447	6,490	9,258
1888	114,584	19.3	38,345	490	1,483	813	212	2,452	944	342	994	6,448	8,774
1889	113,155	18.6	40,243	402	1,550	746	30	2,205	899	293	1,303	5,855	8,294
1890	128,648	20.8	37,392	474	1,612	738	4	913	1,161	312	1,156	4,915	8,468
1891	129,850	20.5	42,740	589	1,926	619	4	2,252	1,200	367	825	5,072	9,179
1892	131,388	20.3	42,434	649	1,664	613	143	2,177	1,350	477	921	5,918	9,185
1893	129,659	19.7	41,643	875	1,685	493	252	1,626	789	366	1,203	5,947	9,056
1894	123,423	18.6	41,472	489	1,640	422	308	1,227	900	331	1,020	6,592	8,956
1895	128,834	19.1	42,002	546	1,716	409	11	850	1,266	370	1,169	4,989	9,055
1896	126,253	18.4	40,136	510	1,542	449	3	759	1,495	340	996	4,597	8,776
1897	118,525	17.1	35,771	538	1,351	380	27	841	873	303	825	4,115	7,267
1898	122,584	17.4	37,113	695	1,810	404	1	837	838	237	1,155	2,612	8,499
1899	121,831	17.0	35,386	702	1,604	248	21	730	756	353	886	2,786	6,480
1900	132,352	18.2	39,204	531	1,948	309	14	689	1,333	466	1,020	3,306	7,959
1901	131,461	17.7	35,775	492	1,741	283	445	1,430	859	363	721	3,026	9,337
1902	124,657	16.4	31,215	456	1,318	189	442	1,215	929	314	923	2,859	8,315
1903	127,602	16.4	32,768	454	1,665	137	41	1,057	721	354	811	3,035	7,480
1904	142,014	17.8	39,086	1,708	1,652	149	13	1,194	1,170	430	426	3,041	8,329
1905	137,222	17.0	38,045	2,566	1,554	106	9	726	988	415	847	2,296	8,955
1906	140,773	17.1	39,292	1,178	1,568	139	7	690	1,369	452	821	2,691	8,578
1907	147,890	17.6	40,168	230	1,673	136	10	1,032	997	483	789	2,603	9,213

DEATHS BY CAUSES 1885 TO DATE — *(Concluded)*.

YEAR.	OTHER CAUSES OF DEATH.										
	Consumption.	Acute respiratory diseases.	Puerperal.	Digestive.	Urinary.	Circulatory.	Nervous.	Cancer.	Violence.	Old age.	Unclassified.
1885	11,238	10,864	974	4,343	4,069	4,069	8,651	1,887	2,994	4,889	7,728
1886	11,947	11,389	884	5,066	4,305	5,238	8,799	2,050	3,296	5,990	8,981
1887	11,609	11,557	885	5,599	4,582	5,737	9,957	2,363	3,780	8,676	9,736
1888	12,383	13,756	1,069	6,146	4,926	6,394	11,174	2,497	3,842	7,994	11,310
1889	12,390	13,833	979	6,501	5,732	6,886	11,266	2,638	3,834	5,980	12,615
1890	13,831	18,053	928	7,696	5,688	7,306	11,593	2,868	4,542	5,484	18,728
1891	13,445	20,647	1,053	8,486	6,473	8,480	13,166	3,028	5,028	6,530	15,371
1892	13,471	20,432	1,131	8,920	6,502	9,013	14,009	3,152	5,543	6,385	14,647
1893	13,123	19,807	1,054	8,834	6,955	9,042	13,826	3,232	5,295	5,826	14,622
1894	12,824	15,885	911	8,745	6,946	8,451	12,948	3,305	5,487	5,497	15,310
1895	13,267	17,725	939	8,892	7,449	9,966	11,724	3,554	5,889	5,569	16,380
1896	13,265	16,820	972	8,955	7,770	10,486	11,925	3,789	7,022	5,377	14,835
1897	12,641	16,277	1,013	8,963	7,866	10,905	12,124	4,131	6,172	5,516	14,950
1898	12,979	16,350	920	10,101	8,641	10,511	13,312	4,385	6,520	5,524	14,641
1899	13,412	17,938	877	10,163	9,064	10,606	13,177	4,533	6,093	6,068	15,324
1900	13,590	19,232	1,136	10,644	9,501	10,676	12,993	4,871	6,714	5,402	16,134
1901	13,766	17,589	1,068	7,478	9,558	11,949	13,366	5,033	7,926	5,439	17,388
1902	12,582	16,986	1,034	7,235	9,604	12,889	12,964	4,990	7,058	4,949	15,833
1903	13,194	17,339	1,110	7,282	9,998	13,561	12,966	5,456	7,646	4,765	17,466
1904	14,159	21,132	1,272	7,866	10,815	14,309	14,142	5,697	8,822	5,120	19,858
1905	14,061	17,832	1,377	8,158	10,697	14,547	13,569	6,056	8,352	4,923	19,025
1906	14,027	20,178	1,326	8,741	11,344	15,395	13,521	6,168	8,874	4,332	18,944
1907	14,431	22,663	1,413	9,035	12,163	16,952	14,539	6,420	9,668	2,723	20,717

Record of each reporting local board of health, showing total deaths, etc.— (Continued).

[Cities are printed in SMALL CAPS, villages in *italics* and towns in Roman type.]

NAME OF PLACE.	Population, State census, 1905.	All deaths.	Cerebro-spinal menin-gitis.	Typhoid fever.	Malarial dis-eases.	Scarlet fever.	Measles.	Whoop-ing cough.	Diph-theria.	Diar-rhea.	Con-sump-tion.	In-fluenza.
Cattaraugus county—(*Continued*)..												
Hinsdale	1,152	13	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Humphrey	680	6	.....	.....	.....	.....	.....	.....	.....	.....	.....	2
Ischua	811	6	.....	.....	.....	.....	.....	.....	.....	.....	1	1
Leon	845	12	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Little Valley	1,722	21	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lyndon	647	6	.....	1	.....	.....	.....	.....	.....	.....	.....	1
Machias	1,494	40	.....	.....	.....	.....	.....	.....	.....	.....	4	1
Mansfield	940	15	.....	.....	.....	.....	.....	1	.....	1	.....	.....
Napoli	791	12	.....	1	.....	.....	.....	.....	.....	.....	1	.....
New Albion	2,047	24	.....	1	.....	.....	.....	.....	1	.....	.....	.....
Olean	5,141	69	1	.....	.....	.....	.....	.....	.....	.....	5	1
Otto	927	15	.....	.....	.....	.....	.....	.....	.....	.....	1	.....
Perrysburg	1,049	15	.....	.....	.....	.....	.....	.....	.....	.....	1	2
Persia	1,858	17	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Portville	2,398	33	.....	1	.....	.....	.....	.....	1	1	.....	2
Randolph	2,346	43	.....	.....	.....	.....	.....	.....	.....	4	1	1
Red House	564	12	.....	.....	.....	.....	.....	.....	.....	1	.....	1
Salamanca	5,455	101	.....	1	.....	.....	1	.....	7	4	8	3
Salamanca	973	14	.....	.....	.....	.....	.....	.....	.....	.....	1	.....
South Valley	562	3	.....	.....	.....	.....	.....	.....	.....	.....	1	.....
Yorkshire	1,730	27	.....	.....	.....	.....	1	.....	.....	.....	1	.....
Cayuga county	65,309	1,102	6	9	.....	1	.....	.....	19	33	75	24
AUBURN	31,422	531	6	2	.....	1	.....	.....	15	26	41	4
Aurelius	1,548	17	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Brutus	2,488	41	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Cato	1,474	33	.....	.....	.....	.....	.....	.....	1	.....	1	.....
Conquest	1,187	22	.....	.....	.....	.....	.....	.....	1	1	1	1
Fleming	1,006	16	.....	.....	.....	.....	.....	.....	.....	.....	1	.....
Genoa	1,866	24	.....	.....	.....	.....	.....	.....	.....	.....	3	1
Ira	1,587	29	.....	.....	.....	.....	.....	.....	.....	.....	1	1
Ledyard	1,996	23	.....	.....	.....	.....	.....	.....	.....	.....	2	.....
Locke	914	16	.....	.....	.....	.....	.....	.....	.....	.....	2	.....

Granger	761	16									1		
Grove	766	12										1	1
Hume	1,817	36									1	2	1
Independence	1,222	12											2
New Hudson	879	11											1
Rushford	1,432	29										1	3
Scio	1,354	24		1								1	3
Ward	521	1											
Wellsville	5,721	16											
West Almond	548	8											1
Willing	1,120	15											
Wirt	1,163	13											
Broome county	72,282	1,170	3	12	3	4		10	17	26	65	32	
BINGHAMTON	42,036	673		8	2	1		5	13	20	44	7	
Barker	984	18						1				4	
Binghamton	703	8										1	
Chenango	1,314	22		1						2		3	
Colesville	2,457	48									1	5	
Conklin	935	13		1									
Dickinson	703	42							2		2	1	
Fenton	1,145	16									2	2	
Kirkwood	887	18									1	1	
Lisle	1,551	17	1								2		
Maine	1,411	18									1		
Nanticoke	621	11						1			1		
Sanford	3,424	45	2							1	1	1	
Triangle	1,633	18			1				1			2	
Union	8,146	134		1		3		3		2	4	3	
Vestal	1,681	35		1						1	5	2	
Windsor	2,634	34							1		1		
Cattaraugus county	66,196	910	5	9			6	1	18	17	49	29	
OLEAN	10,163	138	4	2					8	2	9	1	
Allegany	3,554	48		1						1	4	1	
Ashford	1,567	31					2				3	2	
Carrollton	1,600	7											
Cold Spring	713	7									1	1	
Conewango	1,162	15		1									
Dayton	1,754	26									1	2	
East Otto	1,111	12									2		
Elko	324	6					2			2		1	
Ellicottville	2,115	29											
Farmersville	1,014	10											
Franklinville	2,510	35							1	1	2	1	
Freedom	1,229	16									1	3	
Great Valley	2,167	26									1	1	

Record of each reporting local board of health, showing total deaths, etc.— (Continued).

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Chemung county	51,600	857	.....	13	.....	12	3	5	12	42	64	29
ELMIRA	34,687	564	.....	10	.....	12	2	3	12	35	46	19
Ashland	840	15	.....	.....	.....	.....	.....	1	.....	.....	1	1
Baldwin	506	5	.....	.....	.....	.....	.....	.....	.....	.....	1	.....
Big Flats	1,571	28	.....	.....	.....	.....	.....	.....	.....	1	.....	1
Catlin	912	16	.....	.....	.....	.....	.....	.....	.....	.....	1	2
Chemung	1,328	28	.....	.....	.....	.....	.....	.....	.....	.....	2	1
Elmira	1,377	40	.....	1	.....	.....	.....	1	.....	1	1	3
Erin	898	20	.....	.....	.....	.....	.....	.....	.....	.....	1	.....
Horseheads	4,826	76	.....	1	.....	.....	.....	.....	.....	3	6	1
Southport	2,073	21	.....	1	.....	.....	1	.....	.....	1	1	.....
Van Etten	1,086	17	.....	.....	.....	.....	.....	.....	.....	.....	1	.....
Veteran	1,475	27	.....	.....	.....	.....	.....	.....	.....	1	3	1
Chenango county	36,783	666	4	2	.....	10	.....	1	3	11	34	28
Afton	1,851	25	.....	.....	.....	.....	.....	1	1	.....	.....	1
Bainbridge	1,968	40	.....	.....	.....	.....	.....	.....	.....	.....	5	4
Columbus	863	9	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Coventry	889	19	.....	.....	.....	.....	.....	.....	1	.....	1	2
German	430	4	.....	.....	.....	.....	.....	.....	.....	1	.....	.....
Greene	3,164	43	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Guilford	2,261	32	.....	.....	.....	.....	.....	.....	.....	2	.....	.....
Lincklaen	607	13	.....	.....	.....	.....	.....	.....	.....	.....	1	.....
McDonough	816	19	1	.....	.....	.....	.....	.....	.....	.....	2	1
New Berlin	2,425	32	.....	.....	.....	.....	.....	.....	.....	.....	2	4
North Norwich	742	4	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Norwich	1,332	37	.....	.....	.....	2	.....	.....	.....	.....	2	.....
Norwich	7,115	135	.....	.....	.....	6	.....	.....	1	4	7	4
Otselic	1,111	23	.....	.....	.....	.....	.....	.....	.....	.....	2	2
Oxford	3,258	86	.....	1	.....	1	.....	.....	.....	.....	4	5
Pharsalia	690	16	.....	.....	.....	.....	.....	.....	.....	.....	1	.....
Pitcher	740	15	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Plymouth	995	23	.....	.....	.....	.....	.....	.....	.....	3	1	.....
Preston	626	21	.....	.....	.....	.....	.....	.....	.....	1	1	1
Sherburne	2,695	42	.....	1	.....	1	.....	.....	.....	.....	2	2

Mentz	1,885	34									2	2	
Montezuma	914	14										1	
Moravia	2,723	51		4								5	2
Niles	1,159	24		1								1	2
Owasco	1,302	26									2	2	1
Scipio	1,512	21							1				1
Sempronius	594	19									1		3
Sennett	1,859	35										6	
Springport	1,336	28										1	1
Sterling	2,504	42		1					1		1		3
Summer Hill	669	5										1	1
Throop	984	10											
Venice	1,309	19		1								1	
Victory	1,316	22										3	1
Chautauqua county	96,880	1,388	4	24	1	3	5	1	13	49		78	44
DUNKIRK	15,250	265		12			1		3	20		20	5
JAMESTOWN	26,160	310	1	5					2	6		19	6
Arkright	863	6											
Busti	2,086	30								1		1	2
Carroll	1,638	19										3	
Charlotte	1,193	18								1		1	
Chautauqua	3,505	85							1	2		7	1
Cherry Creek	1,441	25		1					1			3	2
Clymer	1,180	15										2	
Dunkirk	438												
Ellery	1,638	22								1		1	
Ellicott	3,904	43								1		1	2
Ellington	1,264	17							1			2	1
Fredonia	5,148	85	1		1	3	1			1		4	8
French Creek	951	12											
Gerry	1,146	17							2				
Hanover	5,149	71								3		6	1
Harmony	2,782	44										1	2
Kiantone	524	10											
Mina	1,012	13											
Poland	1,497	18	1	1									
Pomfret	7,308	32											2
Portland	3,054	43							2			1	3
Ripley	2,257	24										1	2
Sheridan	1,861	20		1					1			1	
Sherman	1,506	22											
Stockton	1,821	28										1	4
Villenova	1,054	17					2	1				1	
Westfield	1,531	22								2		2	1
Westfield	2,823	55	1	4			1			2			2

Record of each reporting local board of health, showing total deaths, etc.— (Continued).

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Chemung county	51,600	857	.....	13	.....	12	3	5	12	42	64	29
ELMIRA	34,687	564	.....	10	.....	12	2	3	12	35	46	19
Ashland	840	15	.....	.....	.....	.....	.....	1	.....	.....	1	1
Baldwin	506	5	.....	.....	.....	.....	.....	.....	.....	.....	1	.....
Big Flats	1,571	28	.....	.....	.....	.....	.....	.....	.....	1	.....	1
Catlin	912	16	.....	.....	.....	.....	.....	.....	.....	.....	1	2
Chemung	1,328	28	.....	.....	.....	.....	.....	.....	.....	.....	2	1
Elmira	1,377	40	.....	1	.....	.....	.....	1	.....	1	1	3
Erin	898	20	.....	.....	.....	.....	.....	.....	.....	.....	1	.....
Horseheads	4,826	76	.....	1	.....	.....	.....	.....	.....	3	6	1
Southport	2,073	21	.....	1	.....	.....	1	.....	.....	1	1	.....
Van Etten	1,086	17	.....	.....	.....	.....	.....	.....	.....	.....	1	.....
Veteran	1,475	27	.....	.....	.....	.....	.....	.....	.....	1	3	1
Chenango county	36,783	666	4	2	.....	10	.....	1	3	11	34	28
Afton	1,851	25	.....	.....	.....	.....	.....	1	1	.....	.....	1
Bainbridge	1,968	40	.....	.....	.....	.....	.....	.....	.....	.....	5	4
Columbus	863	9	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Coventry	889	19	.....	.....	.....	.....	.....	.....	1	.....	1	2
German	430	4	.....	.....	.....	.....	.....	.....	.....	1	.....	.....
Greene	3,164	43	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Guilford	2,261	32	.....	.....	.....	.....	.....	.....	.....	2	.....	.....
Lincklaen	607	13	.....	.....	.....	.....	.....	.....	.....	.....	1	.....
McDonough	816	19	1	.....	.....	.....	.....	.....	.....	.....	2	1
New Berlin	2,425	32	.....	.....	.....	.....	.....	.....	.....	.....	2	4
North Norwich	742	4	.....	.....	.....	.....	.....	.....	.....	.....	.....	1

Dutchess county	*81,633*	*1,473*	*13*	*35*	*4*	*4*	*8*	*4*	*14*	*40*	*[illegible]*	*[illegible]*	*42*
POUGHKEEPSIE	*25,379*	*535*	*6*	*20*	*3*	*2*	*6*	*1*	*3*	*22*	*[illegible]*	*[illegible]*	*14*
Amenia	*2,152*	*35*	.....	.....	.....	.....	.....	.....	.....	*2*	.....	.....	.....
Beekman	933	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Clinton	1,275	20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2
Dover	1,992	24	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....
East Fishkill	2,088	29	1	.....	.....	.....	.....	.....	.....	1	.....	.....	.....
Fishkill	13,183	236	.....	1	.....	.....	1	2	7	15	19	3	2
Hyde Park	2,944	36	.....	.....	.....	.....	1	.....	.....	1	3	.....	2
La Grange	1,271	17	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Milan	926	17	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1
North East	2,063	33	.....	.....	.....	.....	.....	.....	2	3	1	.....	.....
Pawling	1,840	35	1	1	.....	1	.....	.....	.....	1	6	.....	1
Pine Plains	1,315	31	.....	1	.....	.....	.....	.....	.....	.....	6	.....	1
Pleasant Valley	1,426	28	2	.....	.....	.....	.....	.....	.....	.....	2	.....	1
Poughkeepsie	5,390	87	2	2	.....	.....	.....	.....	.....	7	7	.....	1
Red Hook	3,874	71	.....	1	.....	.....	.....	.....	.....	.....	4	.....	4
Rhinebeck	3,610	51	.....	.....	.....	.....	.....	.....	1	.....	4	.....	2
Stanford	1,641	30	.....	.....	.....	1	.....	.....	1	.....	1	.....	1
Union Vale	976	12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Wappinger	752	34	1	.....	.....	.....	.....	.....	.....	1	.....	.....	.....
Wappingers Falls	3,588	53	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	1
Washington	3,013	64	.....	.....	1	.....	.....	.....	.....	.....	3	.....	6
Erie county	473,700	7,894	9	132	1	42	94	64	73	392	598	85	85
BUFFALO	376,587	6,413	1	113	.....	37	74	58	63	292	496	42	42
TONAWANDA	7,904	109	1	2	.....	.....	.....	.....	2	1	7	3	3
Alden	2,458	35	.....	1	.....	.....	.....	.....	.....	.....	2	.....	.....
Amherst	4,493	53	.....	.....	.....	1	.....	.....	.....	2	5	.....	.....
Aurora	4,180	64	.....	.....	.....	.....	.....	.....	.....	.....	4	.....	.....
Boston	1,627	15	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....
Brandt	1,998	39	.....	1	1	.....	1	.....	.....	3	2	.....	2
Cheektowaga	6,671	139	1	2	.....	.....	.....	.....	.....	14	16	3	1
Clarence	2,817	39	.....	2	.....	.....	2	.....	.....	1	3	.....	.....
Colden	1,307	28	1	.....	.....	.....	.....	.....	.....	.....	1	.....	1
Collins	2,602	48	.....	1	.....	.....	1	.....	.....	1	2	1	1
Concord	4,452	54	.....	1	.....	.....	.....	.....	.....	1	3	1	3
East Hamburg	2,575	30	.....	.....	.....	.....	.....	.....	.....	2	2	3	3
Eden	2,495	33	.....	.....	.....	.....	1	.....	.....	2	4	2	2
Elma	2,155	35	.....	2	.....	.....	.....	.....	.....	2	1	1	1
Evans	2,867	55	1	.....	.....	1	2	.....	2	.....	6	1	5
Grand Island	972	11	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1
Hamburg	5,879	73	.....	.....	.....	.....	1	.....	.....	.....	7	.....	2
Holland	1,451	29	.....	.....	.....	.....	.....	.....	.....	4	.....	.....	1
Lancaster	8,958	88	1	.....	.....	.....	.....	.....	.....	5	8	.....	4
Marilla	1,513	24	.....	.....	.....	.....	.....	.....	.....	.....	3	.....	1
Newstead	3,772	45	.....	.....	.....	.....	.....	.....	.....	1	2	1	2
North Collins	2,514	27	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1

Record of each reporting local board of health, showing total deaths, etc.— (Continued).

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NAME OF PLACE.	Population, State census, 1905.	All deaths.	Cerebro-spinal meningitis.	Typhoid fever.	Malarial diseases.	Scarlet fever.	Measles.	Whooping cough.	Diphtheria.	Diarrhea.	Consumption.	Influenza.
Erie county—(*Continued*).												
Sardinia	1,843	23	.....	1	.....	.....	1	.....	.....	.....	.....	2
Tonawanda	1,511	20	.....	.....	.....	.....	.....	.....	.....	.....	1	1
Wales	1,207	12	.....	.....	.....	.....	.....	.....	1	.....	1	1
West Seneca	14,925	353	3	6	.....	3	11	6	5	61	19	2
Essex county	32,452	505	.....	9	1	3	1	3	4	11	46	17
Chesterfield	2,117	32	.....	2	.....	.....	.....	.....	.....	1	4	1
Crown Point	1,890	28	.....	1	.....	.....	1	.....	.....	.....	1	1
Elizabethtown	1,197	11	.....	.....	.....	.....	.....	.....	1	.....	.....	.....
Essex	1,344	29	.....	.....	.....	.....	.....	1	.....	.....	2	3
Jay	1,985	52	.....	1	.....	.....	.....	.....	.....	.....	2	1
Keene	1,328	15	.....	1	.....	.....	.....	1	.....	.....	.....	2
Lewis	1,049	12	.....	.....	.....	.....	.....	.....	.....	.....	1	.....
Minerva	1,012	14	.....	2	.....	.....	.....	.....	.....	.....	.....	2
Moriah	5,717	108	.....	.....	1	2	.....	1	3	4	3	4
Newcomb	554	6	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
North Elba	3,001	41	.....	.....	.....	.....	.....	.....	.....	1	8	.....
North Hudson	505	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
St. Armand	879	21	.....	.....	.....	.....	.....	.....	.....	.....	12	.....
Schroon	1,213	18	.....	.....	.....	.....	.....	.....	.....	.....	2	2
Ticonderoga	4,691	72	.....	1	.....	1	.....	.....	.....	4	6	.....
Westport	1,763	16	.....	.....	.....	.....	.....	.....	.....	.....	4	1
Willsboro	1,629	18	.....	.....	.....	.....	.....	.....	.....	1	.....	.....
Wilmington	574	7	.....	.....	.....	.....	.....	.....	.....	.....	1	.....
Franklin county	47,012	678	1	8	1	2	1	8	9	23	115	17
Altamont	4,843	43	.....	1	.....	.....	.....	.....	.....	3	.....	.....
Bangor	2,184	30	.....	.....	.....	.....	1	2	.....	1	2	.....
Belmont	2,403	28	.....	.....	.....	.....	.....	.....	1	2	2	2
Bombay	1,386	22	.....	.....	.....	.....	.....	.....	1	.....	3	.....
Brandon	920	14	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Brighton	794	8	.....	.....	.....	.....	.....	.....	.....	.....	5	.....
Burke	1,875	23	.....	1	.....	.....	.....	.....	.....	.....	1	3

Dutchess county	81,633	1,473	13	38	4	4	8	4	14	69	104	12
Poughkeepsie	25,379	525	6	20	3	2	6	1	3	29	29	14
Amenia	2,152	35	.....	.....	.....	.....	.....	.....	.....	2	2	1
Beekman	933	5	.....	.....	.....	.....	.....	.....	.....	.....	1	.....
Clinton	1,275	20	.....	.....	.....	.....	.....	.....	.....	.....	2	.....
Dover	1,992	24	.....	.....	.....	.....	.....	1	.....	.....	2	.....
East Fishkill	2,088	29	1	.....	.....	.....	.....	.....	.....	1	2	2
Fishkill	13,183	236	.....	1	.....	.....	1	2	7	15	19	.....
Hyde Park	2,944	36	.....	.....	.....	.....	1	.....	.....	1	3	2
La Grange	1,271	17	.....	.....	.....	.....	.....	.....	.....	.....	1	1
Milan	926	17	.....	.....	.....	.....	.....	.....	.....	.....	1	1
North East	2,063	33	.....	.....	.....	.....	.....	.....	2	3	1	.....
Pawling	1,840	35	1	1	.....	1	.....	.....	.....	1	6	1
Pine Plains	1,315	31	.....	1	.....	.....	.....	.....	.....	.....	6	1
Pleasant Valley	1,426	28	2	.....	.....	.....	.....	.....	.....	.....	2	1
Poughkeepsie	5,380	87	2	2	.....	.....	.....	.....	.....	7	7	1
Red Hook	3,874	71	.....	1	.....	.....	.....	.....	.....	.....	4	4
Rhinebeck	3,610	51	.....	.....	.....	.....	.....	.....	1	.....	6	2
Stanford	1,641	30	.....	.....	.....	1	.....	.....	1	.....	1	1
Union Vale	976	12	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Wappinger	752	34	1	.....	.....	.....	.....	.....	.....	1	.....	.....
Wappingers Falls	3,588	53	.....	.....	.....	.....	.....	.....	.....	.....	2	1
Washington	3,013	64	.....	.....	1	.....	.....	.....	.....	.....	3	6
Erie county	473,700	7,894	9	132	1	42	94	64	73	392	598	85
BUFFALO	376,587	6,413	1	113	.....	37	74	58	63	292	496	42
TONAWANDA	7,904	109	1	2	.....	.....	.....	.....	2	1	7	3
Alden	2,453	35	.....	1	.....	.....	.....	.....	.....	.....	2	.....
Amherst	4,493	53	.....	.....	.....	1	.....	.....	.....	2	5	.....
Aurora	4,180	64	.....	.....	.....	.....	.....	.....	.....	.....	4	.....
Boston	1,627	15	.....	.....	.....	.....	.....	.....	.....	.....	1	.....
Brandt	1,998	39	.....	1	1	.....	1	.....	.....	3	2	2
Cheektowaga	6,671	139	1	2	.....	.....	.....	.....	.....	14	16	1
Clarence	2,817	39	.....	2	.....	.....	2	.....	.....	1	3	.....
Colden	1,307	28	1	.....	.....	.....	.....	.....	.....	.....	1	1
Collins	2,602	48	.....	1	.....	.....	1	.....	.....	1	2	4
Concord	4,452	54	.....	1	.....	.....	.....	.....	.....	1	3	3
East Hamburg	2,575	30	.....	.....	.....	.....	.....	.....	.....	2	2	2
Eden	2,495	33	.....	.....	.....	.....	1	.....	.....	2	4	2
Elma	2,155	35	.....	2	.....	.....	.....	.....	.....	2	1	1
Evans	2,867	55	1	.....	.....	1	2	.....	2	.....	6	5
Grand Island	972	11	.....	.....	.....	.....	.....	.....	.....	.....	1	1
Hamburg	5,879	73	.....	.....	.....	.....	1	.....	.....	.....	7	2
Holland	1,451	29	.....	.....	.....	.....	.....	.....	.....	4	.....	1
Lancaster	8,958	88	1	.....	.....	.....	.....	.....	.....	5	8	4
Marilla	1,513	24	.....	.....	.....	.....	.....	.....	.....	.....	3	1
Newstead	3,772	45	.....	.....	.....	.....	.....	.....	.....	1	2	2
North Collins	2,514	27	.....	.....	.....	.....	.....	.....	.....	.....	1	1

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Erie county—(*Continued*).												
Sardinia	1,843	23	.....	1	.....	.....	1	.....	.....	.....	.....	2
Tonawanda	1,511	20	.....	.....	.....	.....	.....	.....	.....	.....	1	1
Wales	1,207	12	.....	.....	.....	.....	.....	.....	1	.....	1	1
West Seneca	14,925	353	3	6	.....	3	11	6	5	61	19	2
Essex county	32,452	505	.....	9	1	3	1	3	4	11	46	17
Chesterfield	2,117	32	.....	2	.....	.....	.....	.....	.....	1	4	1
Crown Point	1,890	28	.....	1	.....	.....	1	.....	.....	.....	1	1
Elizabethtown	1,197	11	.....	.....	.....	.....	.....	.....	1	.....	.....	.....
Essex	1,344	29	.....	.....	.....	.....	.....	1	.....	.....	2	3
Jay	1,985	52	.....	1	.....	.....	.....	.....	.....	.....	2	1
Keene	1,328	15	.....	1	.....	.....	.....	1	.....	.....	.....	2
Lewis	1,049	12	.....	.....	.....	.....	.....	.....	.....	.....	1	.....
Minerva	1,012	14	.....	2	.....	.....	.....	.....	.....	.....	.....	2
Moriah	5,717	108	.....	.....	1	2	.....	1	3	4	3	4
Newcomb	554	6	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
North Elba	3,001	41	.....	.....	.....	.....	.....	.....	.....	1	8	.....
North Hudson	505	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
St. Armand	879	21	.....	.....	.....	.....	.....	.....	.....	.....	12	.....
Schroon	1,213	18	.....	.....	.....	.....	.....	.....	.....	.....	2	2
Ticonderoga	4,691	72	.....	1	.....	1	.....	.....	.....	4	6	.....
Westport	1,763	16	.....	.....	.....	.....	.....	.....	.....	.....	4	1
Willsboro	1,629	18	.....	.....	.....	.....	.....	.....	.....	1	.....	.....
Wilmington	574	7	.....	.....	.....	.....	.....	.....	.....	.....	1	.....
Franklin county	47,012	678	1	8	1	2	1	8	9	23	115	17
Altamont	4,843	43	.....	1	.....	.....	.....	.....	.....	3	.....	.....
Bangor	2,184	30	.....	.....	.....	.....	1	2	.....	1	2	.....

Chateaugay	2,651	38								1	2	1	
Constable	1,355	18		1		1				1	2		
Dickinson	1,763	16									1		
Duane	372	8									1		
Fort Covington	2,080	35		1					1		3	4	
Franklin	1,496	22	1								3	1	
Harrietstown	4,113	9											
Malone	6,478	108		2	1				2	7	10	3	
Malone	4,248	63				1		3	2	4	2	3	
Moira	2,477	24		1							1		
Santa Clara	1,053	12		1							2		
Saranac Lake	3,834	88						1		1	55		
Waverly	2,160	45								2	11		
Westville	1,149	24						2	1	1	3		
Fulton county	42,330	684	1	1		2	5	4	4	17	42	19	
GLOVERSVILLE	18,672	309		1		1	1	2	1	12	12	6	
Bleecker	527	12									2		
Broadalbin	1,933	38				1					2	2	
Caroga	449	5											
Ephratah	1,479	22									1	1	
JOHNSTOWN	9,845	149					4		1	2	12	3	
Johnstown	2,493	46						2	1	1	2	1	
Mayfield	2,129	29								1	2	5	
Northampton	2,204	45	1							1	3	1	
Oppenheim	1,258	16											
Perth	676	8							1		1		
Stratford	652	5											
Genesee county	35,878	518	1	5		4		1	4	8	28	28	
Alabama	1,644	18				1					1	1	
Alexander	1,417	19									1		
Batavia	10,080	154		3						3	8	3	
Batavia	2,301	30							1		1		
Bergen	1,614	20		1								2	
Bethany	1,259	35		1							3	3	
Byron	1,505	26				1				2	2		
Darien	1,850	22				1				1		1	
Elba	1,544	9									2	1	
Le Roy	3,395	62	1						2		2	5	
Le Roy	1,712	21							1			2	
Oakfield	1,802	27						1		2	1	4	
Pavilion	1,546	20				1							
Pembroke	2,449	38									5	5	
Stafford	1,319	17									2	1	

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Greene county	31,139	564	5	9	1	1	4	.....	5	19	57	14
Ashland	647	11	.....	.....	.....	.....	.....	.....	.....	1	2	.....
Athens	2,816	64	1	3	.....	.....	3	.....	2	1	6	.....
Cairo	1,960	59	.....	.....	.....	.....	.....	.....	.....	.....	3	.....
Catskill	3,569	54	.....	1	1	.....	.....	.....	.....	.....	9	1
Catskill	5,294	93	2	3	.....	.....	.....	.....	2	4	9	1
Coxsackie	4,317	91	2	1	.....	1	1	.....	1	8	4	4
Durham	1,616	22	.....	1	.....	.....	.....	.....	.....	1	2	1
Greenville	1,626	24	.....	.....	.....	.....	.....	.....	.....	.....	2	3
Halcott	363	8	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Hunter	2,531	40	.....	.....	.....	.....	.....	.....	.....	2	4	.....
Jewett	1,044	9	.....	.....	.....	.....	.....	.....	.....	.....	2	.....
Lexington	1,067	17	.....	.....	.....	.....	.....	.....	.....	.....	1	.....
New Baltimore	2,087	35	.....	.....	.....	.....	.....	.....	.....	1	7	1
Prattsville	761	15	.....	.....	.....	.....	.....	.....	.....	1	2	1
Windham	1,427	22	.....	.....	.....	.....	.....	.....	.....	.....	4	1
Hamilton county	4,912	46	.....	3	.....	.....	1	.....	.....	1	4	.....
Arietta	295	3	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
Benson	215	3	.....	.....	.....	.....	1	.....	.....	.....	1	.....
Hope	317	3	.....	1	.....	.....	.....	.....	.....	.....	1	.....
Indian Lake	1,049	12	.....	.....	.....	.....	.....	.....	.....	1	.....	.....
Inlet	168	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lake Pleasant	494	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Long Lake	1,233	7	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Morehouse	216	3	.....	1	.....	.....	.....	.....	.....	.....	1	.....
Wells	925	10	.....	.....	.....	.....	.....	.....	.....	.....	1	.....
Herkimer county	53,856	777	2	4	.....	.....	.....	2	9	22	80	25
Columbia	1,180	16	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Danube	934	10	.....	.....	.....	.....	.....	.....	2	.....	.....	.....
Fairfield	1,350	14	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Frankfort	4,617	86	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

German Flats	3,565	42	......	......	......	......	......	......	......	......	2	2
Ilion	5,924	92	1	......	......	......	......	1	5	2	6	3
Herkimer	6,506	93	......	1	......	......	......	......	......	6	9	4
Herkimer	1,227	21	......	......	......	......	......	......	......	......	1	......
Litchfield	881	8	......	......	......	......	......	......	......	......	1	......
LITTLE FALLS	11,122	180	1	1	......	......	......	......	......	10	17	8
Little Falls	685	11	......	......	......	......	......	......	......	......	1	......
Manheim	2,887	27	......	......	......	......	......	1	......	......	2	1
Newport	1,690	28	......	......	......	......	......	......	......	......	......	1
Norway	686	9	......	......	......	......	......	......	......	......	1	......
Ohio	704	9	......	......	......	......	......	......	......	......	1	......
Russia	2,056	19	......	......	......	......	......	......	......	......	......	3
Salisbury	1,373	15	......	......	......	......	......	......	1	......	......	1
Schuyler	1,192	18	......	......	......	......	......	......	......	......	......	......
Stark	999	10	......	......	......	......	......	......	......	......	2	......
Warren	1,152	21	......	......	......	......	......	......	......	2	......	1
Webb	1,255	21	......	1	......	......	......	......	1	2	5	......
Wilmurt	309	1	......	......	......	......	......	......	......	......	......	......
Winfield	1,460	26	......	1	......	......	......	......	......	......	2	......
Jefferson county	**80,459**	**1,282**	**1**	**23**	**2**	**2**	**1**	**5**	**23**	**49**	**80**	**37**
WATERTOWN	25,447	504	1	10	......	1	1	2	17	34	34	6
Adams	3,177	48	......	......	......	......	......	......	......	......	2	2
Alexandria	4,261	65	......	2	......	......	......	......	1	1	3	6
Antwerp	2,932	42	......	1	......	......	......	......	2	1	7	1
Brownville	3,904	60	......	3	1	......	......	......	1	......	2	1
Cape Vincent	2,797	32	......	2	......	......	......	......	......	......	1	4
Champion	2,668	35	......	1	......	......	......	......	......	1	2	2
Clayton	4,095	54	......	1	......	......	......	2	1	......	3	3
Ellisburg	3,740	75	......	......	......	......	......	......	......	2	5	3
Henderson	1,517	24	......	......	......	......	......	......	......	1	1	2
Hounsfield	2,346	34	......	......	1	......	......	......	......	......	3	2
Le Ray	2,684	35	......	......	......	......	......	......	......	......	2	1
Lorraine	949	11	......	......	......	......	......	......	......	......	1	2
Lyme	2,098	25	......	1	......	......	......	......	......	......	......	......
Orleans	2,433	37	......	......	......	......	......	......	......	1	4	......
Pamelia	898	27	......	......	......	......	......	......	......	......	1	......
Philadelphia	1,699	35	......	......	......	......	......	......	......	2	1	......
Rodman	1,144	20	......	......	......	......	......	......	......	1	......	......
Rutland	1,883	31	......	1	......	......	......	......	1	5	2	......
Theresa	2,022	27	......	......	......	......	......	......	......	......	2	1
Watertown	1,128	21	......	......	......	......	......	1	......	......	1	......
Wilna	5,866	31	......	1	......	1	......	......	......	......	2	1
Worth	728	9	......	......	......	......	......	......	......	......	1	......

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Lewis county	**26,643**	**357**	**5**	**1**	.....	.....	**3**	**1**	**4**	**2**	**17**	**10**
Croghan	2,983	24	.....	.....	.....	.....	.....	.....	.....	.....	1	.....
Denmark	2,109	35	.....	.....	.....	.....	.....	.....	.....	.....	2	1
Diana	2,335	27	.....	1	.....	.....	.....	.....	.....	1	.....	2
Greig	911	11	1	.....	.....	.....	.....	.....	.....	.....	.....	.....
Harrisburg	731	9	1	.....	.....	.....	.....	.....	.....	.....	2	.....
High Market	589	10	.....	.....	.....	.....	.....	.....	.....	.....	2	.....
Lewis	861	12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Leyden	1,642	29	.....	.....	.....	.....	2	.....	.....	.....	1	1
Lowville	3,921	66	1	.....	.....	.....	.....	.....	1	.....	4	.....
Lyonsdale	1,082	21	.....	.....	.....	.....	1	.....	.....	.....	.....	1
Martinsburg	1,749	20	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Montague	616	6	.....	.....	.....	.....	.....	.....	.....	.....	1	.....
New Bremen	1,764	22	1	.....	.....	.....	.....	1	.....	.....	2	.....
Osceola	513	4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pinckney	846	15	.....	.....	.....	.....	.....	.....	3	.....	.....	1
Turin	1,134	10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Watson	890	13	1	.....	.....	.....	.....	.....	.....	1	.....	1
West Turin	1,963	23	.....	.....	.....	.....	.....	.....	.....	.....	2	2
Lvingston county	**36,450**	**567**	**4**	**4**	**1**	**1**	**3**	**4**	.....	**23**	**30**	**18**
Avon	3,138	62	.....	.....	.....	.....	.....	.....	.....	4	5	.....
Caledonia	2,230	34	1	.....	.....	.....	.....	.....	.....	.....	2	1
Conesus	1,069	19	.....	.....	.....	.....	.....	.....	.....	.....	1	.....
Geneseo	3,338	68	.....	2	.....	.....	1	2	.....	2	6	1
Groveland	1,462	15	1	.....	.....	.....	.....	.....	.....	.....	1	.....
Leicester	1,414	22	.....	.....	.....	.....	1	.....	.....	3	1	2
Lima	2,262	27	1	.....	.....	.....	.....	.....	.....	.....	2	1
Livonia	2,744	46	.....	1	.....	.....	.....	1	.....	4	1	.....
Mt. Morris	3,948	64	1	.....	1	.....	1	.....	.....	3	1	2
North Dansville	374	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dansville	3,908	67	.....	.....	.....	1	.....	1	.....	1	5	4
Nunda	2,274	30	.....	.....	.....	.....	.....	.....	.....	.....	2	1

Pendleton	1,263	18	.....	.....	.....	.....	.....	.....	.....	1	5	.....	
Porter	2,202	32	.....	.....	.....	.....	.....	1	.....	1	.....	.....	
Royalton	4,697	53	1	.....	.....	.....	.....	.....	.....	.....	3	4	
Somerset	2,069	27	.....	.....	.....	.....	.....	1	.....	1	.....	2	
Wheatfield	1,855	26	.....	.....	.....	.....	.....	.....	1	2	1	.....	
NORTH TONAWANDA	10,157	137	.....	5	.....	.....	3	2	2	9	8	1	
Wilson	2,993	41	.....	1	.....	.....	.....	.....	.....	.....	3	.....	
Oneida county	139,341	2,457	6	24	1	8	7	11	25	118	213	47	
UTICA	62,934	1,260	3	10	1	4	3	7	18	78	122	10	
ROME	16,562	340	1	3	.....	1	2	2	4	14	33	11	
Annsville	1,621	33	.....	.....	.....	.....	.....	.....	.....	.....	1	1	
Augusta	2,032	36	.....	.....	.....	.....	.....	.....	.....	.....	1	5	
Ava	609	9	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	
Boonville	3,167	63	.....	1	.....	1	.....	.....	.....	.....	5	2	
Bridgewater	961	17	.....	1	.....	.....	.....	.....	.....	.....	2	3	
Camden	3,750	52	.....	.....	.....	.....	.....	.....	.....	1	6	6	
Deerfield	1,615	20	1	.....	.....	.....	1	.....	.....	1	2	.....	
Florence	1,086	17	.....	1	.....	.....	.....	.....	.....	.....	2	1	
Floyd	739	4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
Forestport	1,457	12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
Kirkland	4,543	69	.....	2	.....	.....	.....	.....	.....	1	2	1	
Lee	1,485	22	.....	.....	.....	.....	.....	.....	.....	.....	1	1	
Marcy	1,385	13	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	
Marshall	1,762	26	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
New Hartford	5,463	50	.....	1	.....	1	.....	.....	.....	1	4	1	
Paris	2,430	51	.....	.....	.....	.....	.....	.....	.....	.....	3	1	
Remsen	1,059	12	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	
Sangerfield	2,246	24	.....	1	.....	.....	.....	.....	.....	1	4	.....	
Steuben	788	14	.....	.....	.....	.....	.....	.....	.....	1	1	1	
Trenton	2,562	42	.....	2	.....	1	.....	.....	.....	.....	2	1	
Vernon	3,072	39	.....	.....	.....	.....	.....	1	.....	3	2	.....	
Verona	3,636	49	1	.....	.....	.....	.....	.....	.....	1	3	.....	
Vienna	1,958	32	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
Western	1,442	17	.....	.....	.....	.....	1	.....	.....	.....	2	.....	
Westmoreland	2,067	33	.....	1	.....	.....	.....	.....	.....	.....	2	.....	
Whitestown	6,895	101	.....	1	.....	.....	.....	1	3	15	11	2	
Onondaga county	178,441	2,841	8	25	1	4	6	3	41	155	200	44	
SYRACUSE	117,503	1,916	7	14	.....	4	5	2	30	126	148	20	
Camillus	2,586	40	.....	1	.....	.....	.....	1	.....	3	2	.....	
Cicero	2,451	33	.....	.....	.....	.....	.....	.....	1	.....	1	3	
Clay	2,410	27	.....	1	.....	.....	.....	.....	.....	1	1	1	
De Witt	6,252	101	1	2	.....	.....	.....	.....	1	8	2	3	
Elbridge	3,041	42	.....	.....	.....	.....	.....	.....	.....	1	4	.....	
Fabius	1,545	29	.....	.....	.....	.....	.....	.....	.....	1	2	.....	
Geddes	4,990	63	.....	2	.....	.....	1	.....	5	5	.....	1	

Record of each reporting local board of health, showing total deaths, etc.— (Continued).

[Cities are printed in SMALL CAPS, villages in *italics* and towns in Roman type.]

NAME OF PLACE.	Population, State census, 1905.	All deaths.	Cerebro-spinal menin-gitis.	Typhoid fever.	Malarial dis-eases.	Scarlet fever.	Measles.	Whoop-ing cough.	Diph-theria.	Diar-rhea.	Con-sump-tion.	In-fluenza.
Montgomery county	49,928	859	.....	11	1	5	2	4	8	44	57	11
AMSTERDAM	23,943	420	.....	4	1	.....	2	1	5	37	26	1
Amsterdam	2,665	39	.....	1	.....	.....	.....	.....	.....	1	2	.....
Canajoharie	3,982	57	.....	.....	.....	.....	.....	.....	.....	2	3	1
Charlestown	932	9	.....	.....	.....	.....	.....	1	.....	.....	.....	1
Florida	2,012	21	.....	.....	.....	.....	.....	.....	1	1	2	.....
Glen	2,191	29	.....	.....	.....	.....	.....	2	.....	1	1	.....
Minden	1,995	25	.....	.....	.....	.....	.....	.....	.....	1	1	.....
Fort Plain	2,596	71	.....	1	.....	4	.....	.....	.....	.....	4	2
Mohawk	2,607	50	.....	.....	.....	.....	.....	.....	.....	.....	6	2
Palatine	2,410	55	.....	1	.....	1	.....	.....	.....	.....	5	.....
Root	1,607	26	.....	1	.....	.....	.....	.....	.....	.....	4	2
St. Johnsville	2,973	57	.....	3	.....	.....	.....	.....	2	1	3	2
Nassau county	69,477	1,049	1	11	3	11	2	17	18	76	87	13
Hempstead	34,746	486	1	2	1	3	1	13	9	32	41	8
North Hempstead	14,163	289	.....	7	1	7	1	4	5	19	20	2
Oyster Bay	20,545	274	.....	2	1	1	.....	.....	4	25	26	3
New York, City of	4,013,781	79,205	.....	740	71	797	728	394	1,741	6,360	8,996	722
Borough of Manhattan	2,112,380	41,319	.....	372	18	344	327	168	841	3,161	4,569	329
Borough of Bronx	271,630	6,379	.....	48	5	77	103	33	175	367	1,459	39
Borough of Brooklyn	1,358,686	26,043	.....	271	42	321	288	154	603	2,295	2,515	334
Borough of Queens	198,240	3,857	.....	36	4	44	5	23	96	379	306	17
Borough of Richmond	72,845	1,607	.....	13	2	11	5	16	26	158	147	8
Niagara county	84,744	1,409	6	57	.....	5	5	22	18	94	94	27
LOCKPORT	17,552	274	.....	9	.....	.....	.....	7	2	6	22	4
NIAGARA FALLS	26,560	531	4	37	.....	4	2	9	13	64	26	7
Cambria	1,782	19	1	.....	.....	.....	.....	1	.....	.....	2	.....
Hartland	2,652	31	.....	.....	.....	.....	.....	.....	.....	.....	1	2
Lewiston	3,033	71	.....	1	.....	.....	.....	.....	.....	3	8	2
Lockport	2,371	73	.....	1	.....	1	.....	.....	.....	3	12	3
Newfane	3,707	57	.....	1	.....	.....	.....	1	.....	2	3	2
[illegible]	1,362	19	.....	2	.....	.....	.....	.....	.....	2	.....	.....

Orange county	108,267	1,867	7	33	3	4	7	10	23	91	173	41
NEWBURGH	*20,498*	530	3	11	1	2	2	5	8	30	65	5
MIDDLETOWN	*14,516*	*240*	.....	*3*	.....	.....	*2*	1	2	8	25	1
Blooming Grove	2,099	35	.....	.....	.....	.....	.....	.....	.....	4	3	2
Chester	2,128	34	.....	.....	.....	.....	.....	.....	.....	1	4	.....
Cornwall	4,860	81	1	1	.....	.....	.....	.....	4	3	4	.....
Crawford	1,626	22	.....	.....	.....	.....	.....	.....	.....	.....	2	1
Deerpark	1,867	34	.....	1	1	.....	.....	.....	.....	2	2	2
Port Jervis	9,695	176	.....	5	1	.....	1	.....	2	7	11	7
Goshen	5,023	113	.....	.....	.....	1	.....	1	.....	4	14	1
Greenville	672	9	.....	.....	.....	.....	.....	.....	.....	.....	1	1
Hamptonburg	1,158	11	.....	.....	.....	.....	.....	.....	.....	1	1	.....
Highlands	3,561	72	.....	1	.....	.....	2	.....	3	3	1	.....
Minisink	1,354	22	.....	.....	.....	.....	.....	.....	.....	.....	1	1
Monroe	2,038	32	.....	1	.....	.....	.....	.....	.....	2	4	.....
Montgomery	6,652	105	1	9	.....	.....	.....	2	2	9	5	.....
Mount Hope	1,128	24	.....	.....	.....	.....	.....	.....	1	.....	3	2
Newburgh	4,785	60	.....	.....	.....	.....	.....	.....	1	2	5	2
New Windsor	2,887	40	.....	1	.....	.....	.....	.....	.....	3	1	3
Tuxedo	2,865	37	.....	.....	.....	1	.....	.....	.....	1	6	.....
Wallkill	2,736	41	1	.....	.....	.....	.....	.....	.....	2	4	2
Warwick	6,690	93	.....	.....	.....	.....	.....	.....	.....	6	8	7
Wawayanda	1,574	17	.....	.....	.....	.....	.....	.....	.....	1	1	1
Woodbury	1,822	40	1	.....	.....	.....	.....	1	.....	2	2	3
Orleans county	31,323	463	3	7	.....	.....	.....	6	6	9	38	13
Albion	5,174	78	.....	3	.....	.....	.....	.....	3	6	13	3
Albion	1,225	20	.....	.....	.....	.....	.....	.....	2	.....	3	.....
Barre	1,809	24	.....	.....	.....	.....	.....	1	.....	.....	2	.....
Carlton	2,236	31	.....	1	.....	.....	.....	1	.....	.....	1	.....
Clarendon	1,455	22	.....	1	.....	.....	.....	1	.....	.....	1	.....
Gaines	1,839	13	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Kendall	1,638	30	1	1	.....	.....	.....	.....	.....	.....	.....	1
Murray	3,931	68	.....	1	.....	.....	.....	1	.....	.....	4	4
Ridgeway	1,016	34	.....	.....	.....	.....	.....	1	.....	1	.....	1
Medina	5,114	84	2	.....	.....	.....	.....	1	.....	2	12	2
Shelby	3,900	22	.....	.....	.....	.....	.....	.....	1	.....	1	.....
Yates	1,961	28	.....	.....	.....	.....	.....	.....	.....	.....	1	2
Oswego county	70,110	1,145	1	24	2	.....	2	.....	11	36	75	34
OSWEGO	22,572	360	.....	15	.....	.....	.....	.....	1	16	27	2
Albion	1,635	28	.....	1	.....	.....	.....	.....	.....	.....	2	.....
Amboy	771	13	.....	.....	.....	.....	.....	.....	.....	.....	1	.....
Boylston	743	21	.....	2	.....	.....	.....	.....	3	.....	1	3
Constantia	2,295	42	.....	.....	.....	.....	.....	.....	1	.....	2	3
Granby	2,038	24	.....	.....	.....	.....	.....	.....	.....	.....	3	2
Hannibal	2,269	29	.....	.....	.....	.....	.....	.....	.....	.....	1	.....

Record of each reporting local board of health, showing total deaths, etc.— (Continued).

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Onondaga county—(*Continued*).												
La Fayette	1,489	14	.....	.....	.....	.....	.....	.....	.....	.....	.....	2
Lysander	1,418	40	.....	1	1	.....	.....	.....	1	.....	1	3
Baldwinsville	2,961	41	.....	1	.....	.....	.....	.....	.....	1	2	3
Manlius	5,821	77	.....	2	.....	.....	.....	.....	2	1	9	.....
Marcellus	2,744	30	.....	.....	.....	.....	.....	.....	.....	1	2	2
Onondaga	5,324	165	.....	1	.....	.....	.....	.....	.....	4	17	1
Otisco	1,131	11	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pompey	2,381	35	.....	.....	.....	.....	.....	.....	.....	2	.....	2
Salina	3,826	64	.....	.....	.....	.....	.....	.....	.....	.....	4	1
Skaneateles	4,261	56	.....	.....	.....	.....	.....	.....	1	1	2	1
Spafford	1,130	10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tully	1,463	19	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Van Buren	3,147	28	.....	.....	.....	.....	.....	.....	.....	.....	3	1
Ontario county	**52,689**	**788**	**2**	**7**	.....	**6**	**2**	**9**	**4**	**18**	**44**	**27**
Bristol	1,268	21	.....	.....	.....	.....	.....	.....	.....	1	1	1
Canadice	577	6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Canandaigua	2,236	28	.....	.....	.....	.....	.....	.....	.....	2	.....	1
Canandaigua	7,332	138	1	2	.....	.....	.....	3	2	3	4	5
East Bloomfield	1,979	27	.....	.....	.....	.....	.....	.....	.....	.....	4	.....
Farmington	1,611	23	.....	.....	.....	1	.....	.....	.....	.....	.....	.....
Geneva	1,080	9	.....	.....	.....	.....	.....	.....	.....	.....	1	2
GENEVA	12,249	179	.....	2	.....	4	.....	3	1	7	16	4
Gorham	2,222	20	.....	.....	.....	.....	.....	.....	.....	.....	.....	3
Hopewell	1,470	52	.....	1	.....	.....	.....	2	1	.....	1	3
Manchester	4,809	90	.....	.....	.....	1	.....	.....	.....	.....	4	3
Naples	2,350	25	.....	.....	.....	.....	.....	.....	.....	.....	1	2
Phelps	4,757	61	1	2	.....	.....	2	.....	.....	1	5	1
Richmond	1,380	19	.....	.....	.....	.....	.....	1	.....	.....	2	.....
Seneca	2,717	27	.....	.....	.....	.....	.....	.....	.....	1	3	2
South Bristol	1,011	7	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Victor	2,387	32	.....	.....	.....	.....	.....	.....	.....	3	1	.....
West Bloomfield	1,244	24	.....	.....	.....	.....	.....	.....	.....	.....	1	.....

	2,446	41		1							2		1
Cooperstown	*970*	*9*											
Fittsfield													
Plainfield	*880*	*14*		*1*									2
Richfield	*2,633*	*40*		*1*								3	1
Roseboom	954	16											1
Springfield	1,604	33		1								2	2
Unadilla	2,511	36		1					1				2
Westford	912	7											2
Worcester	2,328	41		1									8
Putnam county	14,169	243		1	1				6	8	19		10
Carmel	2,601	48								2	3		4
Kent	887	21							1	1	1		
Patterson	1,680	22									1		
Phillipstown	4,977	89			1				3	5	5		5
Putnam Valley	949	13									1		
South East	3,073	50		1					2		8		1
Rensselaer county	122,637	2,362	6	38	2	7	4	18	37	76	263		49
TROY	76,910	1,626	4	20	1	5	4	12	23	63	214		29
Berlin	1,623	30		1					1	1			2
Brunswick	2,714	47		2	1					1	3		
East Greenbush	1,321	16		1				2					2
Grafton	1,075	26		1				1			1		1
RENSSELAER	10,715	170	1	7		1			7	1	12		2
Hoosick	2,966	41							1	1	3		1
Hoosick Falls	5,251	90						1	3	3	8		3
Nassau	1,991	51		3							1		
North Greenbush	1,222	15						1			1		
Petersburg	1,350	19		1						1	1		3
Pittstown	3,099	42									6		
Poestenkill	1,143	21	1						1				1
Sand Lake	2,205	34							1		4		1
Schaghticoke	3,181	58		1				1		2	5		
Schodack	4,424	54		1		1				2	3		2
Stephentown	1,424	22								1	1		2
Rockland county	45,032	257	1	2	1	3		2	6	17	22		8
Clarkstown	7,669	97	1	1		1			1	6	7		5
Haverstraw	10,482												
Orangetown	8,427	101				2		2	5	6	12		1
Nyack	4,441												
Ramapo	10,142												
Stony Point	3,862	59		1	1					5	3		2
St. Lawrence county	90,045	1,352	5	27		1	1	6	12	54	101		52
OGDENSBURG	13,179	264	2	7			1			22	20		5
Brasher	2,333	22							1		3		1
Canton	6,798	117		2					3	4	12		6

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Oswego county —(*Continued*)												
Hastings	2,173	48	.....	1	.....	.....	.....	.....	.....	1	6	2
Mexico	3,079	89	.....	.....	.....	.....	.....	.....	2	1	10	3
New Haven	1,399	39	.....	.....	1	.....	1	.....	1	4	1	2
Orwell	1,029	17	1	1	.....	.....	1	.....	.....	.....	.....	.....
Oswego	2,550	49	.....	1	.....	.....	.....	.....	.....	1	1	.....
Palermo	1,361	26	.....	.....	.....	.....	.....	.....	.....	.....	1	3
Parish	1,383	20	.....	.....	.....	.....	.....	.....	.....	.....	1	2
Redfield	792	5	.....	.....	.....	.....	.....	.....	.....	.....	1	.....
Richland	3,611	48	.....	.....	.....	.....	.....	.....	.....	2	4	5
Sandy Creek	2,217	39	.....	.....	.....	.....	.....	.....	.....	.....	1	1
Schroeppel	2,886	53	.....	.....	.....	.....	.....	.....	.....	2	2	2
Scriba	2,246	32	.....	.....	1	.....	.....	.....	.....	1	3	.....
Volney	2,339	27	.....	1	.....	.....	.....	.....	.....	2	1	2
FULTON	8,847	116	.....	2	.....	.....	.....	.....	1	5	7	2
West Monroe	914	7	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Williamstown	954	13	.....	.....	.....	.....	.....	.....	2	1	2	.....
Otsego county	48,209	798	1	18	.....	.....	1	1	2	11	23	50
Burlington	1,151	16	.....	1	.....	.....	1	.....	.....	.....	.....	2
Butternuts	1,618	23	.....	.....	.....	.....	.....	.....	.....	.....	1	6
Cherry Valley	1,731	30	.....	.....	.....	.....	.....	.....	.....	.....	2	3
Decatur	502	6	.....	.....	.....	.....	.....	.....	.....	.....	.....	2
Edmeston	1,679	19	.....	1	.....	.....	.....	.....	.....	.....	.....	2
Exeter	1,033	12	.....	.....	.....	.....	.....	.....	.....	.....	1	1
Hartwick	1,817	29	.....	2	.....	.....	.....	.....	.....	1	1	4
Laurens	1,500	24	.....	2	.....	.....	.....	.....	.....	.....	.....	.....
Maryland	1,781	27	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
Middlefield	1,869	30	.....	1	.....	.....	.....	.....	1	.....	2	.....
Milford	1,913	26	.....	1	.....	.....	.....	.....	.....	.....	1	2
Morris	1,580	26	.....	.....	.....	.....	.....	.....	.....	.....	2	2
New Lisbon	1,088	27	.....	1	.....	.....	.....	.....	.....	1	.....	2
Oneonta	1,874	42	.....	1	.....	.....	.....	.....	.....	.....	3	.....
Oneonta	8,054	164	.....	2	.....	.....	.....	.....	1	6	5	2
Otego	1,708	32	.....	.....	.....	.....	.....	.....	.....	1	.....	.....
Otsego	2,036	28	.....	.....	.....	.....	.....	.....	.....	.....	.....	3

											2		1
Cooperstown	2,446	41	1										
Pittsfield	970	9											2
Plainfield	889	14		1								3	1
Richfield	2,633	40		1									1
Roseboom	954	16											2
Springfield	1,604	33		1								2	2
Unadilla	2,511	36		1				1					2
Westford	912	7											2
Worcester	2,328	41		1									8
Putnam county	14,169	243		1	1				6	8	19		10
Carmel	2,601	48								2	3		4
Kent	887	21							1	1	1		
Patterson	1,680	22									1		
Phillipstown	4,977	89			1				3	5	5		5
Putnam Valley	949	13									1		
South East	3,073	50		1					2		8		1
Rensselaer county	122,637	2,362	6	38	2	7	4	18	37	76	263		49
TROY	76,910	1,626	4	20	1	5	4	12	23	63	214		29
Berlin	1,623	30		1					1	1			2
Brunswick	2,714	47		2	1					1	3		
East Greenbush	1,321	16		1				2					2
Grafton	1,075	26		1				1			1		1
RENSSELAER	10,715	170	1	7		1			7	1	12		2
Hoosick	2,966	41							1	1	3		1
Hoosick Falls	5,251	90						1	3	3	8		3
Nassau	1,991	51		3							1		
North Greenbush	1,222	15						1			1		
Petersburg	1,350	19		1						1	1		3
Pittstown	3,099	42									6		
Poestenkill	1,143	21	1						1				1
Sand Lake	2,205	34							1		4		1
Schaghticoke	3,181	58		1				1		2	5		
Schodack	4,424	54		1		1				2	3		2
Stephentown	1,424	22								1	1		2
Rockland county	45,032	257	1	2	1	3		2	6	17	22		8
Clarkstown	7,669	97	1	1		1			1	6	7		5
Haverstraw	10,482												
Orangetown	8,427	101				2		2	5	6	12		1
Nyack	4,441												
Ramapo	10,142												
Stony Point	3,862	59		1	1					5	3		2
St. Lawrence county	90,045	1,352	5	27		1	1	6	12	54	101		52
OGDENSBURG	13,179	264	2	7			1			22	20		5
Brasher	2,333	22							1		3		1
Canton	6,798	117		2					3	4	12		6

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St. Lawrence county—(*Continued*)												
Clare	329	7	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Clifton	1,717	24	.....	.....	.....	.....	.....	1	.....	1	.....	.....
Colton	2,099	39	.....	1	.....	.....	.....	.....	2	1	4	3
De Kalb	2,515	39	.....	.....	.....	.....	.....	.....	.....	.....	.....	2
De Peyster	952	6	.....	.....	.....	.....	.....	.....	.....	.....	.....	2
Edwards	1,381	14	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Fine	2,371	22	.....	1	.....	.....	.....	.....	.....	.....	7	1
Fowler	1,756	22	1	1	.....	.....	.....	.....	1	.....	1	.....
Gouverneur	6,582	98	1	3	.....	.....	.....	.....	1	4	4	5
Hammond	1,869	16	.....	1	.....	.....	.....	.....	.....	2	1	.....
Hermon	1,505	31	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hopkinton	1,509	10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lawrence	860	27	.....	.....	.....	.....	.....	.....	.....	.....	1	1
Lisbon	3,166	39	.....	1	.....	.....	.....	.....	.....	.....	1	1
Louisville	1,553	23	.....	.....	.....	1	.....	1	1	.....	2	1
Macomb	1,245	19	.....	.....	.....	.....	.....	.....	.....	.....	2	.....
Madrid	1,664	25	.....	.....	.....	.....	.....	.....	.....	2	3	1
Massena	4,239	77	.....	.....	.....	.....	.....	3	2	2	6	.....
Morristown	1,833	20	.....	1	.....	.....	.....	.....	.....	1	.....	2
Norfolk	2,864	42	.....	.....	.....	.....	.....	1	.....	4	6	1
Oswegatchie	2,303	31	.....	.....	.....	.....	.....	.....	.....	.....	2	3
Parishville	2,111	31	.....	.....	.....	.....	.....	.....	.....	2	2	1
Piercefield	862	8	.....	2	.....	.....	.....	.....	.....	.....	1	.....
Pierrepont	1,641	25	.....	.....	.....	.....	.....	.....	.....	1	2	1
Pitcairn	965	19	.....	3	.....	.....	.....	.....	.....	.....	2	2
Potsdam	4,830	55	.....	1	.....	.....	.....	.....	1	4	5	4
Potsdam	4,162	78	.....	.....	.....	.....	.....	.....	.....	3	4	3
Rossie	1,192	10	.....	3	.....	.....	.....	.....	.....	.....	2	2
Russell	2,036	27	.....	.....	.....	.....	.....	.....	.....	.....	3	.....
Stockholm	2,711	33	1	.....	.....	.....	.....	.....	.....	.....	3	2
Waddington	1,905	32	.....	.....	.....	.....	.....	.....	.....	1	2	1
Saratoga county	62,658	1,079	2	16	.....	2	4	8	6	33 5	81 5	24
Ballston Spa	[illegible]	[illegible]	.....	.....	.....	.....	.....	.....	.....	1	.....	.....
Ballston	[illegible]	[illegible]										
	1 40											

										1	2	1	
Caton	1,215	16											
Cohocton	2,984	36									3	1	2
Corning	2,212	33		1			1		2	3	1		1
Dansville	1,270	20		1						1	1		
Erwin	2,107	37						1	1	1	1		1
Fremont	914												
Greenwood	1,082	15								1	1		
Hartsville	664	12											
Hornby	940	12					1			2			1
Hornellsville	1,942	27											
Howard	1,530	23					1			2	1		1
Jasper	1,365	13											
Lindley	1,174	14											
Prattsburg	1,898	28									2		1
Pulteney	1,384	10											
Rathbone	973	10									1		2
Thurston	927	5									1		
Troupsburg	1,725	17									1		
Tuscarora	1,070	16											1
Urbana	2,517	42	1										2
Wayland	2,700	27									4		3
Wayne	682	10		1									2
West Union	1,011	11											
Wheeler	1,006	10											
Woodhull	1,568	29		2						1	2		3
Suffolk county	81,653	1,236	3	9	4	1		16	9	49	94		21
Babylon	7,919	175			1			2	1	8	13		2
Brookhaven	16,050	269		3	1			3	4	9	22		3
East Hampton	4,303	56						7		2	1		2
Huntington	10,236	150	2							10	12		5
Islip	13,721	190	1	3	1			1	2	6	20		1
Riverhead	4,950	75			1	1				5	3		2
Shelter Island	1,105	9											
Smithtown	3,325	50		1				2			4		2
Southampton	7,976	98		1					2	5	8		2
Sag Harbor	3,048	49		1				1		1	1		
Southold	8,989	115								3	10		2
Sullivan county	34,795	638	1	11		1		1	6	12	160		19
Bethel	2,154	28								1	4		1
Callicoon	2,026	40								1	6		
Cochecton	1,123	24								1	3		
Delaware	1,814	29								1	3		3
Fallsburg	3,810	57	1	1				1	1	2	2		2
Forestburg	544	9									2		
Fremont	2,110	21							1		3		4
Highland	975	22									7		

Record of each reporting local board of health, showing total deaths, etc.— (Continued).

[Cities are printed in SMALL CAPS, villages in *italics* and towns in Roman type.]

NAME OF PLACE.	Population, State census, 1905.	All deaths.	Cerebro-spinal menin-gitis.	Typhoid fever.	Malarial dis-eases.	Scarlet fever.	Measles.	Whoop-ing cough.	Diph-theria.	Diar-rhea.	Con-sump-tion.	In-fluenza.
Schuyler county	15,122	276	1	3	.....	.....	.....	4	1	4	14	12
Catherine	1,268	19	.....	.....	.....	.....	.....	.....	.....	1	1	1
Cayuta	383	8	.....	2	.....	.....	.....	.....	.....	.....	1	1
Dix	3,909	80	1	.....	.....	.....	.....	3	.....	.....	2	3
Hector	3,888	62	.....	.....	.....	.....	.....	.....	.....	.....	1	1
Montour	1,650	27	.....	.....	.....	.....	.....	1	.....	.....	.....	3
Orange	1,197	21	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Reading	1,412	26	.....	.....	.....	.....	.....	.....	.....	1	5	1
Tyrone	1,411	33	.....	1	.....	.....	.....	.....	1	2	4	1
Seneca county	25,315	411	.....	8	.....	1	1	3	5	7	25	10
Covert	1,954	28	.....	.....	.....	.....	.....	.....	.....	1	.....	.....
Fayette	2,718	34	.....	1	.....	.....	.....	.....	.....	.....	3	1
Junius	908	12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lodi	1,540	17	.....	.....	.....	.....	.....	.....	.....	.....	1	.....
Ovid	2,021	29	.....	.....	.....	.....	.....	.....	.....	.....	2	.....
Romulus	2,017	36	.....	.....	.....	1	.....	.....	.....	.....	2	3
Seneca Falls	811	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Seneca Falls	6,733	115	.....	1	.....	.....	1	1	5	4	8	2
Tyre	808	15	.....	.....	.....	.....	.....	.....	.....	1	1	.....
Varick	1,196	25	.....	.....	.....	.....	.....	.....	.....	.....	1	.....
Waterloo	474	24	.....	.....	.....	.....	.....	1	.....	.....	1	1
Waterloo	4,123	75	.....	6	.....	.....	.....	1	.....	1	6	3
Steuben county	81,814	1,200	6	16	.....	1	9	9	7	34	58	42
CORNING	13,515	268	3	10	.....	.....	4	5	1	12	10	8
HORNELL	13,259	184	.....	1	.....	.....	1	2	.....	5	13	5
Addison	2,564	37	.....	.....	.....	.....	1	.....	1	.....	1	2
Avoca	2,151	23	.....	.....	.....	.....	.....	.....	.....	2	1	2
Bath	3,390	77	1	.....	.....	1	.....	.....	.....	.....	4	2
Bath	3,695	47	1	.....	.....	.....	.....	.....	.....	.....	6	2
Bradford	620	10	.....	.....	.....	.....	.....	.....	.....	.....	1	1
Cameron	1,217	20	.....	.....	.....	.....	.....	.....	.....	1	1	.....
Campbell	1,350	18	.....	.....	.....	.....	.....	1	.....	.....	1	.....
Canisteo	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Kingston	439	8	.....	.....	.....	.....	.....	1	.....	.....	1	.....	2	1
Lloyd	2,722	49	.....	.....	.....	.....	.....	.....	3	2	1	4	1	1
Marbletown	2,988	53	.....	.....	.....	.....	.....	.....	.....	1	1	2	4	1
Marlborough	3,917	64	.....	.....	.....	.....	.....	.....	.....	.....	.....	4	4	1
New Paltz	*2,162*	*62*	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	4	1
Olive	2,347	47	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	9	3
Plattekill	1,823	18	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....
Rochester	2,822	56	.....	2	.....	.....	.....	1	1	.....	.....	.....	5	.....
Rosendale	4,670	52	1	1	1	.....	.....	.....	.....	.....	4	2	4	2
Saugerties	5,914	117	1	1	.....	1	.....	2	9	4	4	11	4	2
Saugerties	3,833	71	.....	1	.....	.....	.....	.....	.....	.....	4	11	4	2
Shandaken	3,045	41	.....	.....	.....	1	1	.....	.....	.....	2	1	.....	.....
Shawangunk	2,467	40	.....	.....	.....	.....	.....	.....	.....	.....	5	4	1	.....
Ulster	3,797	50	.....	.....	.....	.....	.....	1	.....	.....	4	3	.....	.....
Wawarsing	4,343	49	1	1	.....	.....	.....	2	.....	.....	1	8	3	.....
Ellenville	2,872	55	.....	2	.....	.....	.....	.....	.....	.....	.....	4	2	.....
Woodstock	1,665	31	.....	.....	.....	.....	.....	.....	.....	.....	.....	5	2	.....
Warren county	31,935	505	1	12	1	.....	2	3	1	13	45	11	.....	.....
Bolton	1,561	21	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	.....	.....
Caldwell	1,489	37	.....	2	.....	.....	.....	.....	.....	2	2	1	.....	.....
Chester	1,965	51	.....	.....	.....	.....	.....	1	.....	.....	3	2	.....	.....
Hague	1,054	7	.....	.....	.....	.....	.....	.....	.....	.....	1	1	.....	.....
Horicon	1,114	9	.....	.....	.....	.....	.....	.....	.....	.....	1	1	.....	.....
Johnsburg	2,364	36	.....	3	1	.....	.....	.....	.....	1	1	1	.....	.....
Luzerne	3,371	20	1	.....	.....	.....	.....	.....	.....	.....	3	.....	.....	.....
Queensbury	2,131	33	.....	.....	.....	.....	2	.....	.....	2	2	.....	.....	.....
Glens Falls	14,650	229	.....	7	.....	.....	.....	2	1	8	18	2	.....	.....
Stony Creek	910	9	.....	.....	.....	.....	.....	.....	.....	.....	3	.....	.....	.....
Thurman	833	13	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....
Warrensburg	2,483	40	.....	.....	.....	.....	.....	.....	.....	.....	10	.....	.....	.....
Washington county	47,376	790	2	12	.....	1	.....	1	2	24	63	38	.....	.....
Argyle	1,821	46	.....	.....	.....	.....	.....	.....	.....	.....	6	.....	.....	.....
Cambridge	1,850	58	.....	.....	.....	.....	.....	.....	.....	.....	6	3	.....	.....
Dresden	620	17	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Easton	2,210	33	.....	.....	.....	.....	.....	.....	.....	.....	2	3	.....	.....
Fort Ann	2,250	39	.....	3	.....	.....	.....	.....	.....	.....	2	.....	.....	.....
Fort Edward	5,300	91	.....	.....	.....	.....	.....	.....	.....	3	5	3	.....	.....
Sandy Hill	5,321	78	.....	.....	.....	.....	.....	.....	1	1	9	7	.....	.....
Granville	6,487	101	.....	1	.....	.....	.....	1	1	5	10	6	.....	.....
Greenwich	4,338	83	2	1	.....	.....	.....	.....	.....	1	10	8	.....	.....
Hampton	671	10	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....
Hartford	1,270	23	.....	.....	.....	.....	.....	.....	.....	1	2	1	.....	.....
Hebron	1,599	20	.....	1	.....	.....	.....	.....	.....	.....	1	.....	.....	.....
Jackson	1,052	19	.....	.....	.....	.....	.....	.....	.....	1	2	.....	.....	.....
Kingsbury	1,713	22	.....	.....	.....	.....	.....	.....	.....	2	.....	1	.....	.....
Putnam	507	4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Salem	2,802	53	.....	1	.....	1	.....	.....	.....	3	1	3	.....	.....
White Creek	2,425	16	.....	.....	.....	.....	.....	.....	.....	2	4	.....	.....	.....
Whitehall	980	11	.....	1	.....	.....	.....	.....	.....	.....	1	1	.....	.....
Whitehall	4,148	66	.....	4	.....	.....	.....	.....	.....	5	1	2	.....	.....

Record of each reporting local board of health, showing total deaths, etc.— (Continued).

[Cities are printed in SMALL CAPS, villages in *italics* and towns in Roman type.]

NAME OF PLACE.	Population, State census, 1905.	All deaths.	Cerebro-spinal menin-gitis.	Typhoid fever.	Malarial dis-eases.	Scarlet fever.	Measles.	Whoop-ing cough.	Diph-theria.	Diar-rhea.	Con-sump-tion.	In-fluenza.
Sullivan county—(*Continued*)												
Liberty	5,483	153	.....	1	.....	.....	.....	.....	2	1	84	.....
Lumberland	749	14	.....	.....	.....	.....	.....	.....	.....	.....	1	.....
Mamakating	3,199	55	.....	2	.....	.....	.....	.....	.....	.....	12	.....
Neversink	2,009	32	.....	.....	.....	.....	.....	.....	.....	2	5	1
Rockland	3,714	53	.....	5	.....	1	.....	.....	2	2	6	1
Thompson	4,165	86	.....	2	.....	.....	.....	.....	.....	1	20	6
Tusten	907	15	.....	.....	.....	.....	.....	.....	.....	.....	2	1
Tioga county	**26,907**	**459**	**2**	**11**	.....	**2**	.....	.....	**6**	**6**	**18**	**14**
Waverly	4,915	79	.....	1	.....	.....	.....	.....	4	3	3	3
Barton	1,744	20	.....	.....	.....	.....	.....	.....	1	.....	.....	2
Berkshire	919	17	.....	.....	.....	.....	.....	.....	.....	.....	1	.....
Candor	3,148	50	.....	3	.....	.....	.....	.....	.....	.....	1	2
Newark Valley	2,102	35	.....	.....	.....	1	.....	.....	.....	.....	1	4
Nichols	1,456	23	.....	.....	.....	.....	.....	.....	1	.....	.....	.....
Owego	2,994	58	.....	2	.....	.....	.....	.....	.....	1	4	1
Owego	5,010	102	1	2	.....	1	.....	.....	.....	2	5	2
Richford	1,001	19	.....	.....	.....	.....	.....	.....	.....	.....	2	.....
Spencer	1,598	23	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tioga	2,017	33	1	3	.....	.....	.....	.....	.....	.....	1	.....
Tompkins county	**34,151**	**561**	**2**	**1**	.....	.....	.....	.....	**9**	**13**	**37**	**15**
ITHACA	14,615	242	1	.....	.....	.....	.....	.....	8	8	19	3
Caroline	1,704	22	.....	.....	.....	.....	.....	.....	.....	.....	.....	2
Danby	2,246	37	1	.....	.....	.....	.....	.....	.....	1	1	1
Dryden	3,716	57	.....	.....	.....	.....	.....	.....	.....	.....	3	1
Enfield	1,111	16	.....	.....	.....	.....	.....	.....	.....	.....	1	.....
Groton	3,210	47	.....	1	.....	.....	.....	.....	2	2	2	2
Ithaca	1,573	26	.....	.....	.....	.....	.....	.....	1	.....	1	.....
Lansing	2,653	47	.....	.....	.....	.....	.....	.....	.....	1	5	4
Newfield	1,685	22	.....	.....	.....	.....	.....	.....	.....	1	1	.....
Ulysses	2,630	45	.....	.....	.....	.....	.....	.....	.....	.....	4	2
Ulster county	**86,660**	**1,478**	**5**	**16**	**3**	**3**	**4**	**12**	**36**	**57**	**139**	**44**
KINGSTON	25,556	478	.....	7	1	1	1	2	16	15	48	13
Denning	688	9	.....	.....	.....	.....	.....	.....	.....	.....	1	.....
Esopus	4,786	78	1	1	1	.....	1	1	3	6	5	4
Gardiner	1,437	14	.....	.....	.....	.....	.....	.....	.....	.....	3	1
Hardenburg	657	9	.....	.....	.....	.....	.....	.....	.....	1	.....	.....
Hurley	1,677	27	.....	.....	.....	.....	.....	.....	3	1	4	1

Kingston	439	8	.....	.....	.....	.....	.....	.....	.....	1	.....	2	
Lloyd	2,722	49	.....	.....	.....	.....	1	.....	1	2	4	1	
Marbletown	2,988	53	.....	.....	.....	.....	.....	3	2	1	2	1	
Marlborough	3,917	64	.....	.....	.....	.....	.....	.....	1	4	4	1	
New Paltz	2,162	62	.....	.....	.....	.....	.....	.....	.....	2	4	1	
Olive	2,347	47	1	.....	.....	.....	.....	.....	.....	.....	9	3	
Plattekill	1,823	18	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	
Rochester	2,822	56	.....	2	.....	.....	.....	1	1	.....	5	.....	
Rosendale	4,670	52	1	1	1	.....	.....	.....	.....	4	2	4	
Saugerties	5,914	117	1	1	.....	1	.....	2	9	4	11	2	
Saugerties	3,833	71	.....	1	.....	.....	.....	.....	.....	4	11	2	
Shandaken	3,045	41	.....	.....	.....	1	1	.....	.....	2	1	.....	
Shawangunk	2,467	40	.....	.....	.....	.....	.....	.....	.....	5	4	1	
Ulster	3,797	50	.....	.....	.....	.....	.....	1	.....	4	3	.....	
Wawarsing	4,343	49	1	1	.....	.....	.....	2	.....	1	8	3	
Ellenville	2,872	55	.....	2	.....	.....	.....	.....	.....	.....	4	2	
Woodstock	1,665	31	.....	.....	.....	.....	.....	.....	.....	.....	5	2	
Warren county	**31,935**	**505**	**1**	**12**	**1**	.....	**2**	**3**	**1**	**13**	**45**	**11**	
Bolton	1,561	21	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	
Caldwell	1,489	37	.....	2	.....	.....	.....	.....	.....	2	2	1	
Chester	1,965	51	.....	.....	.....	.....	.....	1	.....	.....	3	2	
Hague	1,054	7	.....	.....	.....	.....	.....	.....	.....	.....	1	1	
Horicon	1,114	9	.....	.....	.....	.....	.....	.....	.....	.....	1	1	
Johnsburg	2,364	36	.....	3	1	.....	.....	.....	.....	1	1	1	
Luzerne	3,371	20	1	.....	.....	.....	.....	.....	.....	.....	3	.....	
Queensbury	2,131	33	.....	.....	.....	.....	2	.....	.....	2	2	.....	
Glens Falls	14,650	229	.....	7	.....	.....	.....	2	1	8	18	2	
Stony Creek	910	9	.....	.....	.....	.....	.....	.....	.....	.....	3	.....	
Thurman	833	13	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	
Warrensburg	2,483	40	.....	.....	.....	.....	.....	.....	.....	.....	10	.....	
Washington county	**47,376**	**790**	**2**	**12**	.....	**1**	.....	**1**	**2**	**24**	**63**	**38**	
Argyle	1,821	46	.....	.....	.....	.....	.....	.....	.....	.....	6	.....	
Cambridge	1,850	58	.....	.....	.....	.....	.....	.....	.....	.....	6	3	
Dresden	620	17	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
Easton	2,210	33	.....	.....	.....	.....	.....	.....	.....	.....	2	3	
Fort Ann	2,250	39	.....	3	.....	.....	.....	.....	.....	.....	2	.....	
Fort Edward	5,300	91	.....	.....	.....	.....	.....	.....	.....	3	5	3	
Sandy Hill	5,321	78	.....	.....	.....	.....	.....	.....	1	1	9	7	
Granville	6,487	101	.....	1	.....	.....	.....	1	1	5	10	6	
Greenwich	4,338	83	2	1	.....	.....	.....	.....	.....	1	10	8	
Hampton	671	10	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	
Hartford	1,270	23	.....	.....	.....	.....	.....	.....	.....	1	2	1	
Hebron	1,599	20	.....	1	.....	.....	.....	.....	.....	.....	1	.....	
Jackson	1,052	19	.....	.....	.....	.....	.....	.....	.....	1	2	.....	
Kingsbury	1,713	22	.....	.....	.....	.....	.....	.....	.....	2	.....	1	
Putnam	507	4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
Salem	2,802	53	.....	1	.....	1	.....	.....	.....	3	1	3	
White Creek	2,425	16	.....	.....	.....	.....	.....	.....	.....	2	4	.....	
Whitehall	980	11	.....	1	.....	.....	.....	.....	.....	.....	1	1	
Whitehall	4,148	66	.....	4	.....	.....	.....	.....	.....	5	1	2	

SUMMARY OF VITAL STATISTICS FOR 1907 IN THE CITIES OF THE STATE GROUPED IN ORDER OF POPULATION.

	Estimated population, 1907.	Total deaths.	Annual death rate per 1,000 population.	Ages.			Epidemic Diseases.										Pulmonary tuberculosis.	Cancer.
				Deaths under one year of age.	Deaths 1 to 5 years of age.	Deaths at 60 years and over.	Typhoid fever.	Malarial disease.	Smallpox.	Measles.	Scarlatina.	Whooping cough.	Diphtheria and croup.	Influenza.	Erysipelas.	Cerebrospinal meningitis.		
City of New York	*4,244,411*	*79,205*	*18.7*	*17,438*	*8,357*	*16,235*	*740*	*71*	*9*	*728*	*797*	*394*	*1,741*	*722*	*295*	.....	*8,996*	*5,227*
BOROUGH OF MANHATTAN	2,217,294	41,319	18.6	9,602	4,387	7,773	372	18	1	327	344	168	841	329	202	.....	4,569	1,782
BOROUGH OF THE BRONX	300,078	6,379	21.3	1,044	612	1,248	48	5	.....	103	77	33	175	39	18	.....	1,459	250
BOROUGH OF BROOKLYN	1,435,530	26,043	18.1	5,503	2,889	5,876	271	42	8	288	321	154	603	334	64	.....	2,515	993
BOROUGH OF QUEENS	216,336	3,857	17.8	937	353	863	36	4	.....	5	44	23	96	17	8	.....	309	126
BOROUGH OF RICHMOND	75,173	1,607	21.4	352	116	475	13	2	.....	5	11	16	26	3	3	.....	147	76
Cities between 100,000 and 400,000	*796,704*	*13,197*	*16.6*	*2,518*	*1059*	*4,044*	*174*	.....	*1*	*88*	*59*	*93*	*210*	*95*	*48*	*39*	*1060*	*672*
Buffalo	386,263	6,413	16.6	1,495	677	1,806	113	.....	1	74	37	58	63	42	19	1	496	324
Rochester	189,288	2,968	15.7	406	189	969	27	.....	.....	5	14	18	64	19	18	31	239	153
Syracuse	121,153	1,916	15.8	399	98	591	14	.....	.....	5	4	2	30	20	8	7	148	92
Albany	100,000	1,900	19.0	218	95	678	20	.....	.....	4	4	15	53	14	3	.....	177	103
Cities between 50,000 and 100,000	*279,500*	*4,982*	*17.8*	*1,109*	*385*	*1,338*	*44*	*2*	.....	*19*	*29*	*34*	*68*	*53*	*10*	*16*	*502*	*194*
Troy	77,650	1,626	21.0	289	89	482	20	1	.....	4	5	12	23	29	2	4	214	75
Utica	65,550	1,260	19.2	284	76	384	10	1	.....	3	4	7	18	10	4	3	122	56
Yonkers	67,230	1,068	15.9	271	107	246	8	.....	.....	1	7	4	9	7	1	4	85	36
Schenectady	69,069	1,028	14.9	285	113	226	6	.....	.....	11	13	11	18	7	3	5	81	27
Cities between 20,000 and 50,000	*396,700*	*6,673*	*16.8*	*1,261*	*468*	*2,108*	*172*	*8*	.....	*33*	*28*	*37*	*125*	*104*	*10*	*32*	*611*	*302*
Binghamton	43,787	673	15.4	110	44	256	8	2	.....	.....	1	5	13	10	1	.....	44	29
Elmira	35,734	564	15.8	74	36	202	10	.....	.....	2	12	3	12	19	2	.....	46	25
Auburn	32,963	531	16.1	70	31	200	2	.....	.....	.....	1	.....	15	4	.....	6	41	23
Niagara Falls	29,400	531	18.1	147	48	94	37	.....	.....	2	4	9	13	7	2	4	26	17
Jamestown	27,466	310	11.3	42	5	117	5	.....	.....	.....	.....	.....	2	6	.....	1	19	9
Newburgh	27,120	530	19.6	93	32	177	11	1	.....	2	2	5	5	5	1	3	11	5

Watertown	26,947	504	18.7	101	30	157	10			1	1	2	17	6		1	34	12
Mt. Vernon	26,516	399	15.1	93	36	100	10				4		5	4	2		30	25
Kingston	25,964	478	18.5	68	30	159	7	1		1	1	2	16	13		4	48	25
Poughkeepsie	25,919	525	20.3	80	26	207	29	3		6	2	1	3	14	1	6	29	23
Amsterdam	25,147	420	16.8	93	40	97	4	1		2		1	5	1	1		26	11
Cohoes	24,291	510	21.1	139	58	111	19			15		8	6	6		4	61	12
Oswego	22,720	360	15.9	67	13	137	15						1	2			27	11
New Rochelle	22,784	338	14.9	84	39	94	5			2		1	7	7		3	15	
Cities between 10,000 and 20,000	*304,200*	*4,841*	*15.9*	*752*	*268*	*1,741*	*98*	*1*		*16*	*9*	*33*	*60*	*98*	*13*	*15*	*376*	*202*
Gloversville	18,800	309	16.4	57	16	121	1			1	1	2	1	6			12	11
Rome	17,726	340	19.2	43	22	144	3			2	1	2	4	11	4	1	33	7
Lockport	17,940	274	15.3	32	13	127	9					7	2	4			22	7
Middletown	15,914	240	15.1	23	14	101	3			2		1	2	1			25	13
Dunkirk	16,702	265	15.9	74	22	64	12			1			3	5			20	7
Glens Falls, village	15,464	229	14.8	35	9	98	7					2	1	2	2		18	8
Ogdensburg	14,842	264	17.8	46	16	105	7			1				5		2	20	13
Ithaca	15,205	242	16.1	27	11	100							8	3		1	19	14
Watervliet	14,710	254	17.3	36	16	79	3				1	1	5	10			26	8
Corning	14,495	268	18.6	44	20	85	10			4		5	1	8		3	10	11
Peekskill, village	14,336	233	16.3	55	25	67	2	1				5	5	2		1	22	9
Hornell	13,390	184	13.7	21	5	75	1			1		2		5			13	11
Saratoga Springs, village	13,235	289	21.8	26	9	132	7					1	2	10	1		21	19
Geneva	12,975	179	13.9	25	10	76	2				4	3	1	4	1		16	11
Cortland	12,174	155	12.9	15	3	76	3				1		2	2			11	9
Little Falls	11,418	180	15.8	30	4	66	1							8		1	17	8
Rensselaer	12,013	170	14.2	23	10	60	7				1		7	2	1	1	12	8
Hudson	10,954	198	18.2	31	6	89	1						4	2	2		21	6
Plattsburg	10,884	139	12.9	26	11	45	3			1			2	3	1	1	13	3
Batavia, village	10,400	154	14.8	21	5	59	3							3	1		8	9
North Tonawanda	10,591	137	13.0	43	11	33	5			3		2	2	1			8	5
Olean	10,443	138	13.3	19	10	39	2						8	1		4	9	5
Cities under 10,000	*45,540*	*678*	*14.9*	*87*	*29*	*293*	*9*	*1*		*5*			*7*	*19*	*3*	*1*	*48*	*36*
Port Jervis	9,819	176	18.0	23	9	69	5	1		1			2	7			11	7
Johnstown	9,845	149	15.2	14	7	77				4			1	3	2		12	11
Fulton	9,103	116	12.9	21	4	47	2						1	2			7	6
Oneida	8,772	128	14.7	13	7	63							1	4	1		11	8
Tonawanda	8,000	109	13.6	16	2	37	2						2	3		1	7	4
TOTAL URBAN MORTALITY	*6,067,164*	*109,576*	*18.1*	*23,165*	*10,566*	*25,759*	*1,231*	*83*	*10*	*889*	*922*	*591*	*2,209*	*1,091*	*379*	*103*	*11,493*	*4,633*
TOTAL RURAL MORTALITY	*2,319,511*	*38,314*	*16.3*	*4,846*	*1,591*	*18,833*	*442*	*53*		*108*	*110*	*198*	*394*	*1,295*	*104*	*127*	*2,958*	*1,787*

SUMMARY OF VITAL STATISTICS FOR 1907 IN THE CITIES OF THE STATE GROUPED IN ORDER OF POPULATION.

	Estimated population, 1907.	Total deaths.	Annual death rate per 1,000 population.	AGES.			EPIDEMIC DISEASES.										Pulmonary tuberculosis.	Cancer.
				Deaths under one year of age.	Deaths 1 to 5 years of age.	Deaths at 60 years and over.	Typhoid fever.	Malarial diseases.	Smallpox.	Measles.	Scarlatina.	Whooping cough.	Diphtheria and croup.	Influenza.	Erysipelas.	Cerebrospinal meningitis.		
City of New York	*4,244,411*	*79,205*	*18.7*	*17,438*	*8,357*	*16,235*	*740*	*71*	*9*	*728*	*797*	*394*	*1,741*	*722*	*295*	.....	*8,996*	*3,227*
BOROUGH OF MANHATTAN	2,217,294	41,319	18.6	9,602	4,387	7,773	372	18	1	327	344	168	841	329	202	.....	4,569	1,782
BOROUGH OF THE BRONX	300,078	6,379	21.3	1,044	612	1,248	48	5	.....	103	77	33	175	39	18	.....	1,459	250
BOROUGH OF BROOKLYN	1,435,530	26,043	18.1	5,503	2,889	5,876	271	42	8	288	321	154	603	334	64	.....	2,515	993
BOROUGH OF QUEENS	216,336	3,857	17.8	937	353	863	36	4	.....	5	44	23	96	17	8	.....	306	126
BOROUGH OF RICHMOND	75,173	1,607	21.4	352	116	475	13	2	.....	5	11	16	26	3	3	.....	147	76
Cities between 100,000 and 400,000	*796,704*	*13,197*	*16.6*	*2,518*	*1059*	*4,044*	*174*	.....	*1*	*88*	*59*	*93*	*210*	*95*	*48*	*39*	*1060*	*672*
Buffalo	386,263	6,413	16.6	1,496	677	1,806	113	.....	1	74	37	58	63	42	19	1	496	324
Rochester	189,288	2,968	15.7	406	189	969	27	.....	.....	5	14	18	64	19	18	31	239	153
Syracuse	121,153	1,916	15.8	399	98	591	14	.....	.....	5	4	2	30	20	8	7	148	92
Albany	100,000	1,900	19.0	218	95	678	20	.....	.....	4	4	15	53	14	3	.....	177	103
Cities between 50,000 and 100,000	*279,500*	*4,982*	*17.8*	*1,109*	*385*	*1,338*	*44*	*2*	.....	*19*	*29*	*34*	*68*	*53*	*10*	*16*	*502*	*194*
Troy	77,650	1,626	21.0	269	89	482	20	1	.....	4	5	12	23	29	2	4	214	75
Utica	65,550	1,260	19.2	284	76	384	10	1	.....	3	4	7	18	10	4	3	122	56
Yonkers	67,230	1,068	15.9	271	107	246	8	.....	.....	1	7	4	9	7	1	4	85	36
Schenectady	69,069	1,028	14.9	285	113	226	6	.....	.....	11	13	11	18	7	3	5	81	27
Cities between 20,000 and 50,000	*396,700*	*6,673*	*16.8*	*1,261*	*468*	*2,108*	*172*	*8*	.....	*33*	*28*	*37*	*123*	*104*	*10*	*32*	*511*	*302*
Binghamton	43,787	673	15.4	110	44	256	8	2	.....	.....	1	5	13	10	1	.....	44	29
Elmira	35,734	564	15.8	74	36	202	10	.....	.....	2	12	3	12	19	2	.....	46	25
Auburn	32,963	531	16.1	70	31	200	2	.....	.....	.....	1	.....	15	4	.....	6	41	32
Niagara Falls	29,400	531	18.1	147	48	94	37	.....	.....	2	4	9	13	7	2	4	26	17
Jamestown	27,466	310	11.3	42	5	117	5	.....	.....	.....	.....	.....	2	6	.....	1	19	17
Newburgh	27,120	530	19.0	93	32	177	11	1	.....	2	2	5	8	5	1	3	65	27

Watertown	26,947	504	18.7	101	30	157	10	.....	...	4	4	....	5	4	.....	4	30	25
Mt. Vernon	26,516	399	15.1	93	36	100	10	.....	...	....	1	2	16	13	....	....	48	25
Kingston	25,964	478	18.5	68	30	159	7	1	...	1	1	2	1	3	14	1	0	29	25
Poughkeepsie	25,919	525	20.3	80	26	207	29	3	...	6	2	1	3	1	1	....	....	26	22
Amsterdam	25,147	420	16.8	93	40	97	4	1	...	2	....	1	5	1	1	....	....	26	22
Cohoes	24,291	510	21.1	139	58	111	19	...	...	15	....	8	6	6	....	....	4	61	11
Oswego	22,720	360	15.9	67	13	137	15	...	...	....	....	....	1	2	....	....	....	27	12
New Rochelle	22,784	338	14.9	84	39	94	5	...	...	2	....	1	7	7	....	3	15	11	
Cities between 10,000 and 20,000	*304,200*	*4,841*	*15.9*	*752*	*268*	*1,741*	*92*	*1*	...	*16*	*9*	*33*	*60*	*98*	*13*	*16*	*376*	*202*	
Gloversville	18,800	309	16.4	57	16	121	1	...	...	1	1	2	1	6	....	....	12	11	
Rome	17,726	340	19.2	43	22	144	3	...	...	2	1	2	4	11	4	1	33	7	
Lockport	17,940	274	15.3	32	13	127	9	...	...	....	....	7	2	4	....	....	22	7	
Middletown	15,914	240	15.1	23	14	101	3	...	...	2	....	1	2	1	....	....	25	13	
Dunkirk	16,702	265	15.9	74	22	64	12	...	...	1	.....	....	3	5	....	....	20	7	
Glens Falls, village	15,464	229	14.8	35	9	98	7	...	...	....	.....	2	1	2	2	....	18	8	
Ogdensburg	14,842	264	17.8	46	16	105	7	...	...	1	.....	....	....	5	....	2	20	13	
Ithaca	15,205	242	16.1	27	11	100	....	...	...	....	.....	....	8	3	....	1	19	14	
Watervliet	14,710	254	17.3	36	16	79	3	...	...	....	1	1	5	10	....	....	26	8	
Corning	14,495	268	18.6	44	20	85	10	...	...	4	....	5	1	8	....	3	10	11	
Peekskill, village	14,336	233	16.3	55	25	67	2	1	.....	.....	....	5	5	2	....	1	22	9	
Hornell	13,390	184	13.7	21	5	75	1	...	.....	1	....	2	.....	5	....	....	13	11	
Saratoga Springs, village	13,235	289	21.8	26	9	132	7	...	.....	....	....	1	2	10	1	....	21	19	
Geneva	12,975	179	13.9	25	10	76	2	...	.....	....	4	3	1	4	1	....	16	11	
Cortland	12,174	155	12.9	15	3	76	3	...	.....	....	1	....	2	2	.....	....	11	9	
Little Falls	11,418	180	15.8	30	4	66	1	...	.....	....	....	....	....	8	....	1	17	8	
Rensselaer	12,013	170	14.2	23	10	60	7	.....	...	....	1	....	7	2	1	1	12	8	
Hudson	10,954	198	18.2	31	6	89	1	.....	...	....	....	....	4	2	2	....	21	6	
Plattsburg	10,884	139	12.9	26	11	45	3	.....	...	1	....	....	2	3	1	1	13	3	
Batavia, village	10,400	154	14.8	21	5	59	3	.....	...	....	....	....	....	3	1	....	8	9	
North Tonawanda	10,591	137	13.0	43	11	33	5	.....	...	3	....	2	2	1	....	....	8	5	
Olean	10,443	138	13.3	19	10	39	2	...	...	....	....	....	8	1	....	4	9	5	
Cities under 10,000	*45,540*	*678*	*14.9*	*87*	*29*	*293*	*9*	*1*	..	*5*	...	....	*7*	*19*	*3*	*1*	*48*	*36*	
Port Jervis	9,819	176	18.0	23	9	69	5	1	..	1	....	....	2	7	....	....	11	7	
Johnstown	9,845	149	15.2	14	7	77	.....	...	...	4	....	....	1	3	2	....	12	11	
Fulton	9,103	116	12.9	21	4	47	2	...	...	....	....	....	1	2	....	....	7	6	
Oneida	8,772	128	14.7	13	7	63	.....	...	...	....	....	....	1	4	1	....	11	8	
Tonawanda	8,000	109	13.6	16	2	37	2	...	...	....	....	....	2	3	....	1	7	4	
TOTAL URBAN MORTALITY	*6,067,164*	*109,576*	*18.1*	*23,165*	*10,566*	*25,759*	*1,251*	*85*	*10*	*889*	*922*	*591*	*2,209*	*,091*	*379*	*103*	*11,493*	*4,633*	
TOTAL RURAL MORTALITY	*2,319,511*	*38,314*	*16.3*	*4,846*	*1,591*	*18,833*	*448*	*58*	..	*108*	*110*	*198*	*894*	*,295*	*104*	*127*	*2,958*	*1,787*	

POPULATION OF THE SANITARY DISTRICTS.

DISTRICTS.	1890.	1900.	1905.	1907.
Maritime	2,743,959	3,753,614	4,393.861	4,686.262
Hudson Valley	679,647	690,000	703,893	710,579
Adirondack and Northern	378,577	394,772	408,116	413,178
Mohawk Valley	368,503	408,974	444,741	460,528
Southern Tier	401,864	428,543	438,936	442,574
East Central	382,954	401,082	414,209	419.076
West Central	314,876	315,945	315.677	314,433
Lake Ontario and Western	727,473	876,206	947,875	978,703
Entire State	5,997,853	7,269,136	8,067,308	8,425,333

Jamestown	16	43	32	21	14	0	27	21	12	2	2	5	...	15	17	26	1	508	20.7	19
Newburgh	31	71	46	37	28	30	26	51	12	4	2	3	1	20	4	32	7	482	17.0	23
Watertown	29	49	46	46	21	34	45	16	17	5	3	...	2	37	9	31	6	538	20.0	27
Mt. Vernon	16	37	40	32	31	38	26	24	11	1	3	2	3	27	2	28	1	635	24.0	29
Kingston	17	81	46	36	23	15	29	39	10	2	1	1	3	20	10	27	4	523	20.2	19
Poughkeepsie	21	53	62	32	32	29	33	30	18	2	3	1	5	25	13	43	4	571	22.1	18
Amsterdam	31	50	37	38	32	37	29	22	8	4	5	1	2	21	5	31	4	562	22.5	10
Cohoes	21	57	45	32	41	46	32	27	7	3	4	1	2	32	2	25	3	454	18.8	24
Oswego	21	51	40	22	12	16	39	29	10	6	...	1	4	23	7	19	3	433	19.1	11
New Rochelle	17	37	24	30	24	42	16	16	11	1	2	1	4	17	3	37	5	608	26.8	21
Cities between 10,000 and 20,000	277	610	565	366	232	234	396	288	117	47	31	8	40	234	117	329	35	5,947	19.5	232
Gloversville	22	55	35	21	26	12	27	13	9	3	3	...	2	21	4	18	3	310	16.5	16
Rome	14	36	57	16	11	14	25	20	9	2	3	...	3	17	15	27	3	434	24.5	14
Lockport	14	38	43	16	11	6	20	21	5	...	2	3	...	9	13	22	...	315	17.6	16
Middletown	17	25	26	20	12	8	16	22	8	2	2	1	2	5	3	23	1	238	14.9	15
Dunkirk	13	21	26	32	8	20	35	10	7	3	1	...	2	15	1	20	3	571	34.2	16
Glens Falls, village	18	33	31	14	10	8	14	14	4	2	1	...	4	19	5	12	...	269	17.4	5
Ogdensburg	12	37	35	17	13	22	21	20	2	3	2	...	1	15	8	7	1	287	19.3	13
Ithaca	25	38	26	8	9	8	21	16	6	1	3	1	3	11	6	14	3	230	15.2	8
Watervliet	10	33	22	30	22	19	18	12	5	3	...	...	2	7	6	9	2	221	15.0	6
Corning	9	27	28	27	10	12	29	8	11	4	3	1	1	13	8	21	4	273	19.0	9
Peekskill, village	12	36	11	24	13	27	17	10	3	...	...	...	2	14	2	15	...	292	20.4	12
Hornell	15	20	29	16	10	5	12	6	3	4	...	...	1	10	2	17	1	240	17.9	13
Saratoga Springs, village	12	27	40	28	16	5	26	32	5	3	1	...	3	12	3	15	...	251	19.1	23
Geneva	11	15	22	10	15	7	13	8	7	1	1	...	2	9	4	12	...	250	19.4	12
Cortland	19	18	15	12	1	5	13	16	5	2	1	...	...	5	3	11	1	208	17.3	10
Little Falls	11	20	23	9	7	10	15	10	8	2	...	...	3	5	5	15	2	240	21.1	0
Rensselaer	6	20	18	20	5	1	15	5	3	3	1	1	1	7	7	14	4	212	17.7	11
Hudson	11	31	21	9	8	15	13	19	9	2	3	1	1	4	3	11	1	177	16.2	6
Plattsburg	9	22	16	9	7	16	12	2	1	2	...	...	2	1	6	3	4	250	23.1	1
Batavia, village	10	17	14	12	3	3	16	10	3	1	3	...	4	7	8	18	1	169	16.3	8
North Tonawanda	2	24	15	3	12	9	8	4	2	3	...	...	1	18	2	8	...	295	27.9	15
Olean	7	17	12	13	3	2	10	10	2	1	1	...	...	10	3	17	1	215	20.7	3
Cities under 10,000	46	98	80	84	31	19	58	49	16	7	4	1	4	40	17	42	3	837	18.4	27
Port Jervis	9	30	17	9	9	7	17	15	3	...	1	1	...	8	4	10	2	172	17.6	4
Johnstown	15	23	29	5	5	2	11	8	1	...	...	...	...	9	4	4	...	146	14.9	6
Fulton	10	13	12	2	3	5	9	10	1	3	1	...	3	12	4	10	...	186	20.7	8
Oneida	7	15	11	13	7	4	11	4	8	2	1	...	1	5	3	10	1	180	20.7	4
Tonawanda	5	17	11	5	7	1	10	12	3	2	1	...	...	6	2	8	...	153	19.1	5
TOTAL URBAN MORTALITY	5,850	8,971	12,147	8,176	9,672	8,011	6,841	6,806	2,060	114	366	164	883	5,610	1,437	7,183	251	158,177	96.1	9,222
TOTAL RURAL MORTALITY	1,981	5,568	4,805	2,838	1,977	1,202	2,694	2,438	859	299	335	23	255	1,515	1,286	2,485	198	37,558	16.2	1,039

POPULATION OF THE SANITARY DISTRICTS.

DISTRICTS.	1890.	1900.	1905.	1907.
Maritime	2,743,959	3,753,614	4,393,861	4,686,262
Hudson Valley	679,647	690,000	703,893	710,579
Adirondack and Northern	378,577	394,772	408,116	413,178
Mohawk Valley	368,503	408,974	444,741	460,528
Southern Tier	401,864	428,543	438,936	442,574
East Central	382,954	401,082	414,209	419,076
West Central	314,876	315,945	315,677	314,433
Lake Ontario and Western	727,473	876,206	947,875	978,703
Entire State	5,997,853	7,269,136	8,067,308	8,425,333

RELATIVE AREA, DENSITY OF POPULATION AND DEATH RATES IN THE SANITARY DISTRICTS FOR 1907.

DISTRICTS.	Area in square miles. (land).	Population per square mile.	Urban death rate.	Rural death rate.	Total death rate.	PERCENTAGE OF DEATHS.			
						Under 1 year.	Between 1 and 5 years.	At 60 years and over.	From epidemic diseases.
Maritime	1,946	2,408	18.6	17.8	18.4	21.8	10.3	21.7	6.9
Hudson Valley	5,679	125	19.2	17.3	18.2	14.5	5.3	40.0	7.5
Adirondack and Northern	13,358	31	17.2	13.2	15.2	15.3	4.6	44.4	7.7
Mohawk Valley	5,179	89	18.3	15.7	16.6	16.3	6.0	40.7	6.3
Southern Tier	6,419	69	14.8	16.1	15.6	12.2	3.7	46.8	7.7
East Central	6,252	67	15.5	16.9	15.9	12.1	3.6	48.1	7.0
West Central	4,588	69	15.6	16.7	16.6	9.7	3.6	52.2	7.0
Lake Ontario and Western	4,199	233	16.2	15.6	16.0	18.1	7.4	35.0	6.9
Entire State	47,620	177	18.1	16.4	17.5	18.9	8.2	30.1	6.4

RELATIVE AREA, DENSITY OF POPULATION AND DEATH RATES IN THE SANITARY DISTRICTS FOR 1907.

DISTRICTS.	Area in square miles. (land).	Population per square mile.	Urban death rate.	Rural death rate.	Total death rate.	PERCENTAGE OF DEATHS.			
						Under 1 year.	Between 1 and 5 years.	At 60 years and over.	From epidemic diseases.
Maritime	1,946	2,408	18.6	17.8	18.4	21.8	10.3	21.7	6.9
Hudson Valley	5,679	125	19.2	17.3	18.2	14.5	5.3	40.0	7.5
Adirondack and Northern	13,358	31	17.2	13.2	15.2	15.3	4.6	44.4	7.7
Mohawk Valley	5,179	89	18.3	15.7	16.6	16.3	6.0	40.7	6.3
Southern Tier	6,419	69	14.8	16.1	15.6	12.2	3.7	46.8	7.7
East Central	6,252	67	15.5	16.9	15.9	12.1	3.6	48.1	7.0
West Central	4,588	69	15.6	16.7	16.6	9.7	3.6	52.2	7.0
Lake Ontario and Western	4,199	233	16.2	15.6	16.0	18.1	7.4	35.0	6.9
Entire State	47,620	177	18.1	16.4	17.5	18.9	8.2	30.1	6.4

TOTAL MORTALITY FOR THE YEAR 1907.

SANITARY DISTRICTS.	Estimated population, 1907.	Total deaths.	Annual death rate per 1,000 population.	AGES.			EPIDEMIC DISEASES.										Pulmonary tuberculosis.	Cancer.
				Deaths under one year of age.	Deaths 1 to 5 years of age.	Deaths at 60 years and over.	Typhoid fever.	Malarial diseases.	Smallpox.	Measles.	Scarlatina.	Whooping cough.	Diphtheria and croup.	Influenza.	Erysipelas.	Cerebrospinal meningitis.		
MARITIME DISTRICT*																		
City of New York:																		
BOROUGH OF MANHATTAN	2,217,294	41,319	18.6	9,602	4,387	7,773	372	18	1	327	344	168	841	329	202	.....	4,569	1,782
BOROUGH OF THE BRONX	300,078	6,379	21.3	1,044	612	1,248	48	5	.....	103	77	33	175	39	18	.....	1,459	250
BOROUGH OF BROOKLYN	1,435,530	26,043	18.1	5,503	2,889	5,876	271	42	8	288	321	154	603	334	61	.....	2,515	993
BOROUGH OF QUEENS	216,336	3,857	17.8	937	353	863	36	4	.....	5	44	23	96	17	8	.....	306	126
BOROUGH OF RICHMOND	75,173	1,607	21.4	352	116	475	13	2	.....	5	11	16	26	3	3	.....	147	76
Totals	4,244,411	79,205	18.7	17,438	8,357	16,235	740	71	9	728	797	394	1,741	722	293	.....	8,996	3,227
Oyster Bay (Nassau Co.)	22,229	274	12.3	55	16	101	2	1	.....	.....	1	.....	4	3	.....	.....	26	9
Hempstead (Nassau Co.)	37,818	496	13.1	93	41	187	2	1	.....	1	3	13	10	8	.....	1	41	25
North Hempstead (Nassau Co.)	15,009	289	19.3	62	22	84	7	1	.....	1	7	4	5	2	3	.....	20	9
Southold (Suffolk Co.)	9,263	115	12.5	19	4	60	.....	.....	.....	.....	.....	.....	.....	2	.....	.....	10	6
Saq Harbor (Suffolk Co.)	3,263	49	15.0	5	4	25	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	1	2
Huntington (Suffolk Co.)	10,536	150	14.2	29	10	65	.....	.....	.....	.....	.....	.....	.....	5	.....	2	12	8
Brookhaven (Suffolk Co.)	16,632	269	16.2	45	21	111	3	1	.....	.....	.....	3	4	3	2	.....	22	6
YONKERS (Westchester Co.)	67,230	1,068	15.9	271	107	246	8	.....	.....	1	7	4	9	7	1	4	85	36
Greenburgh (Westchester Co.)	19,863	292	14.7	53	23	95	5	1	.....	3	.....	.....	10	2	.....	2	17	11
MOUNT VERNON (Westchester Co.)	26,516	399	15.1	93	36	100	10	.....	.....	.....	4	.....	5	4	.....	4	30	20
Port Chester (Westchester Co.)	12,700	204	16.1	59	29	44	7	.....	.....	2	.....	2	3	3	1	1	12	7
Ossining (Westchester Co.)	7,135	174	24.4	26	7	73	1	.....	.....	.....	.....	.....	6	.....	6	1	10	6
NEW ROCHELLE (Westchester Co.)	22,784	338	14.9	84	39	91	5	.....	.....	2	.....	1	7	7	.....	2	15	11
Peekskill (Westchester Co.)	14,336	233	16.3	55	25	67	2	1	.....	.....	.....	5	5	2	.....	1	22	9
White Plains (Westchester Co.)	13,051	236	18.1	53	17	57	1	3	.....	.....	.....	1	10	3	.....	.....	19	8
Mamaroneck (Westchester Co.)	5,236	85	16.2	16	10	27	.....	.....	.....	.....	.....	.....	.....	1	1	1	7	2
Rest of District	101,593	2,279	22.4	339	81	817	15	9	.....	5	4	22	23	38	6	6	245	112
Totals for the District	4,649,605	86,155	18.5	18,795	8,849	18,488	808	89	9	743	823	450	1,842	812	315	26	9,590	3,514

RENSSELAER (Rensselaer Co.)	12,013	170	14.2	23	10	60	7	.....	.....	.....	1	.....	7	2	1	1	12	8
Coxsackie (Greene Co.)	4,403	91	20.7	16	10	38	1	.....	.....	1	1	.....	1	4	.....	2	4	2
Catskill (Greene Co.)	5,294	93	17.6	16	2	37	3	.....	.....	.....	.....	.....	2	1	.....	2	9	4
HUDSON (Columbia Co.)	10,594	193	18.2	31	6	89	1	.....	.....	.....	.....	.....	4	2	2	.....	21	6
KINGSTON (Ulster Co.)	25,961	478	18.5	68	30	159	7	1	.....	1	1	2	16	13	.....	.....	48	25
Ellenville (Ulster Co.)	2,872	55	19.2	3	0	32	2	.....	.....	.....	.....	.....	.....	2	.....	.....	4	3
Marbletown (Ulster Co.)	3,000	53	17.7	7	4	26	.....	.....	.....	.....	.....	3	2	1	.....	.....	2	.....
Rosendale (Ulster Co.)	4,670	52	11.1	9	4	17	1	1	.....	.....	.....	.....	.....	4	.....	1	2	.....
Esopus (Ulster Co.)	4,786	78	16.3	14	10	33	1	1	.....	1	.....	1	3	4	.....	1	5	5
Saugerties (Ulster Co.)	3,860	71	18.4	10	1	35	1	.....	.....	.....	.....	.....	.....	2	.....	.....	11	6
POUGHKEEPSIE (Dutchess Co.)	25,919	525	20.3	80	26	207	29	3	.....	6	2	1	3	14	1	6	29	25
Fishkill (Dutchess Co.)	13,249	236	17.8	50	12	81	1	.....	.....	1	.....	2	7	2	.....	.....	19	11
Wappingers Falls (Dutchess Co.)	3,620	53	14.6	6	1	25	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	2	5
NEWBURGH (Orange Co.)	27,120	530	19.6	93	32	177	11	1	.....	2	2	5	8	5	1	3	65	22
PORT JERVIS (Orange Co.)	9,819	176	17.9	23	9	69	5	1	.....	1	.....	.....	2	7	.....	.....	11	7
MIDDLETOWN (Orange Co.)	15,914	240	15.1	23	14	101	3	.....	.....	2	.....	1	2	1	.....	.....	25	13
Warwick (Orange Co.)	6,804	93	13.7	11	5	53	.....	.....	.....	.....	.....	.....	.....	7	1	.....	8	3
Goshen (Orange Co.)	5,205	113	21.7	19	3	51	.....	.....	.....	.....	1	1	.....	1	.....	.....	14	6
Montgomery (Orange Co.)	6,936	105	15.1	21	2	45	9	.....	.....	.....	.....	2	2	.....	.....	1	5	.....
Haverstraw (Rockland Co.)	10,724	127	11.8	28	9	41	2	5	.....	.....	.....	1	2	4	2	.....	10	4
Nyack (Rockland Co.)	4,507	92	20.4	10	8	38	.....	.....	.....	.....	2	2	1	5	1	.....	7	6
Ramapo (Rockland Co.)	11,198	168	15.0	34	9	64	1	.....	.....	.....	.....	.....	1	2	.....	.....	22	3
Rest of District	264,960	4,674	17.6	587	200	2,280	47	8	.....	14	16	22	70	141	12	18	411	202
Totals for the District	710,253	12,925	18.2	1,871	680	5,181	194	22	.....	52	36	80	225	289	26	44	1,235	571
Totals for 1906	705,000	12,026	17.0	1,685	699	3,845	184	26	.....	56	17	76	162	17	27	108	1,126	580

* Includes Greater New York, Long Island (Nassau and Suffolk counties) and Westchester county.
† Includes Rockland, Putnam, Orange, Dutchess, Ulster, Greene, Columbia, Albany and Rensselaer counties.
Cities are printed in SMALL CAPITALS, Villages in *Italic* and Towns in Roman type.

VITAL STATISTICS FOR THE YEAR — (*Continued*).

SANITARY DISTRICTS.[1]	Other general diseases.	Diseases of the nervous system.	Diseases of the circulatory system.	Pneumonia.	Other diseases of the respiratory system.	Diarrhœa and enteritis (under 2 years).	Other diseases of the digestive system.	Bright's disease.	Other diseases of the genito-urinary system.	The puerperal state.	Diseases of the skin.	Diseases of the organs of locomotion.	Malformations.	Early infancy (under 3 months).	Old age (60 years and over).	External causes.	Ill-defined diseases.	Births. Total births.	Births. Annual birth rate per 1,000 population.	Births. Still births.
MARITIME DISTRICT*																				
City of New York:																				
BOROUGH OF MANHATTAN	2,384	2,980	4,185	3,262	4,428	3,161	1,916	2,604	591	398	132	44	311	2,323	225	2,915	507	65,771	29.7	4,041
BOROUGH OF THE BRONX	327	437	697	399	391	367	263	330	90	51	17	7	50	268	44	379	55	8,487	28.3	458
BOROUGH OF BROOKLYN	1,225	1,882	3,279	2,120	2,485	2,295	1,469	1,704	479	290	56	46	277	984	317	1,475	67	38,632	26.9	2,303
BOROUGH OF QUEENS	151	240	448	294	391	379	194	268	63	32	10	8	20	227	57	348	62	5,825	26.9	454
BOROUGH OF RICHMOND	72	128	170	127	111	158	100	115	24	12	5	2	5	89	42	120	25	2,001	26.7	155
Totals	4,159	5,667	8,779	6,202	7,806	6,360	3,942	5,021	1,247	783	220	107	663	3,891	685	5,237	716	120,716	28.4	7,411
Oyster Bay (Nassau Co.)	15	31	22	9	11	25	19	28	10	5	1	1	1	19	7	22	2	355	16.0	18
Hempstead (Nassau Co.)	34	71	43	33	29	32	29	30	5	4	8	....	4	26	7	35	1	719	19.0	31
North Hempstead (Nassau Co.)	15	28	22	25	23	19	21	15	12	2	4	1	3	13	1	22	4	305	20.3	2
Southold (Suffolk Co.)	9	15	18	8	3	3	12	11	3	2	....	....	....	5	.....	7	1	165	17.8	2
Sag Harbor (Suffolk Co.)	3	6	9	3	7	1	6	4	2	.....	....	....	1	1	1	1	.....	55	16.9	1
Huntington (Suffolk Co.)	3	15	21	7	11	10	11	8	5	2	2	....	4	4	2	18	.....	199	18.9	6
Brookhaven (Suffolk Co.)	17	42	23	8	24	9	17	19	5	2	2	....	2	16	14	20	5	274	16.5	11
YONKERS (Westchester Co.)	59	102	117	86	64	110	95	58	42	14	2	1	5	48	8	78	17	1,473	22.0	103
Greenburgh (Westchester Co.)	19	25	30	31	12	14	21	29	7	3	2	....	4	15	4	24	1	298	16.5	17
MOUNT VERNON (Westchester Co.)	16	37	40	32	31	38	26	24	11	1	3	2	3	27	2	28	1	635	24.7	29
Port Chester (Westchester Co.)	11	19	8	14	23	23	14	12	4	1	....	1	3	17	.....	13	3	225	17.7	15
Ossining (Westchester Co.)	9	25	23	13	5	9	17	15	3	.....	3	....	1	4	3	11	3	180	25.2	5
NEW ROCHELLE (Westchester Co.)	17	37	24	30	24	42	16	16	11	1	2	1	4	17	3	37	5	608	26.8	21
Peekskill (Westchester Co.)	12	36	11	24	13	27	17	10	3	.....	....	....	2	14	2	15	.....	292	20.4	12
White Plains (Westchester Co.)	14	23	23	15	10	22	21	12	4	3	2	....	2	14	.....	22	4	344	26.4	0
Mamaroneck (Westchester Co.)	5	9	7	8	9	8	7	3	2	.....	....	....	....	5	.....	10	.....	110	21.0	10
Rest of District	97	388	271	198	130	94	130	172	29	14	16	2	4	84	27	129	9	.....	.....	.....
Totals for the District	4,514	6,576	9,491	6,746	8,235	6,846	4,421	5,487	1,405	837	267	116	706	4,220	766	5,729	772	.....	.....	.....
Totals for 1906	7,592	6,162	7,789	11,381	2,239	6,135	4,324	5,904	1,189	824	187	78	970	2,341	1,084	5,214	786	.....	.....	.....

RENSSELAER (Rensselaer Co.)	6	20	18	20	5	1	15	5	3	3	1	1	1	7	7	14	4	83	18.8	10
Coxsackie (Greene Co.)	5	17	5	11	6	8	5	3	4		1		2	3	1	3	1	100	18.8	6
Catskill (Greene Co.)	5	17	8	2	4	4	5	8	1				1	6	3	7	1			
HUDSON (Columbia Co.)	11	31	21	9	8	15	13	19	9	2	3	1	1	4	3	11	1	177	16.2	
KINGSTON (Ulster Co.)	17	81	46	36	23	15	29	39	10	2	1	1	3	20	10	27	4	523	20.2	19
Ellenville (Ulster Co.)	2	16	10	2	1		4	5		1	1			2	3	3		50	17.4	1
Marbletown (Ulster Co.)	5	11	5	11	3	1	4	2		1	1					1		26	8.7	0
Rosendale (Ulster Co.)	2	4	4	4	5	4	7	4	1	1				2		4	1	82	17.6	0
Esopus (Ulster Co.)	3	8	6	11	1	6	4	2	1	1	1			6	1	5		28	5.9	0
Saugerties (Ulster Co.)	1	12	8	6	5	4	1	7	2				1	2	1	1		59	15.3	0
POUGHKEEPSIE (Dutchess Co.)	21	53	62	32	32	29	35	30	18	2	3	1	5	25	13	43	4	571	22.1	18
Fishkill (Dutchess Co.)	5	30	18	27	15	15	17	16	8		2		1	7	3	28	1	281	21.2	14
Wappingers Falls (Dutchess Co.)	7	6	6	2	4		5	6	3	1	1		1	1		2		93	24.9	4
NEWBURGH (Orange Co.)	31	71	46	37	28	30	26	51	12	4	2	3	1	20	4	32	7	482	17.9	23
PORT JERVIS (Orange Co.)	9	36	17	9	9	7	17	15	3		1	1		8	4	10	2	172	17.6	4
MIDDLETOWN (Orange Co.)	17	25	26	20	12	8	16	22	8	2	2	1	2	5	3	23	1	238	14.9	15
Warwick (Orange Co.)	5	13	10	5	3	6	7	5	5	2	2		1	3	4	3		77	11.3	8
Goshen (Orange Co.)	5	23	14	5	4	4	8	4	1				2	7	3	9	1	48	9.2	4
Montgomery (Orange Co.)	9	9	9	9	9	9	8	3	1					8	5	7		117	16.9	6
Haverstraw (Rockland Co.)	5	14	10	22	12	5	3	10			1			7		8		129	12.0	7
Nyack (Rockland Co.)	7	15	8	6	5	1	10		2	1			1	4	1	8		56	12.4	2
Ramapo (Rockland Co.)	8	23	18	15	11	10	7	11	5	3			3	7	2	15		226	20.2	14
Rest of District	208	761	549	361	255	150	304	321	97	28	49	1	28	155	115	312	19			
Totals for the District	610	1,760	1,531	995	732	525	859	857	307	83	94	16	68	517	291	780	126			
Totals for 1906	876	1,524	1,495	954	560	422	916	756	210	81	34	3	21	438	523	702	172			

*Includes Greater New York, Long Island (Nassau and Suffolk counties) and Westchester county.
†Includes Rockland, Putnam, Orange, Dutchess, Ulster, Greene, Columbia, Albany and Rensselaer counties.
Cities are printed in SMALL CAPITALS, Villages in *Italic* and Towns in Roman type.

TOTAL MORTALITY FOR THE YEAR — (*Continued*).

SANITARY DISTRICTS.	Estimated population.	Total deaths.	Annual death rate per 1,000 population.	Ages.			Epidemic Diseases.										Pulmonary tuberculosis.	Cancer.
				Deaths under one year of age.	Deaths 1 to 5 years of age.	Deaths at 60 years and over.	Typhoid fever.	Malarial diseases.	Smallpox.	Measles.	Scarlatina.	Whooping cough.	Diphtheria and croup.	Influenza.	Erysipelas.	Cerebrospinal meningitis.		
ADIRONDACK AND NORTHERN DISTRICT*																		
WATERTOWN (Jefferson Co.)	26,947	504	18.7	101	30	157	10	.....	.....	1	1	2	17	6	2	1	34	34
Ellisburgh (Jefferson Co.)	3,740	75	20.1	17	1	41	.....	.....	.....	.....	.....	.....	.....	3	.....	.....	5	2
Carthage (Jefferson Co.)	3,606	52	14.4	10	3	23	1	.....	.....	.....	.....	.....	2	3	.....	.....	1	.....
Clayton (Jefferson Co.)	4,100	54	13.2	4	3	25	1	.....	.....	.....	.....	2	1	3	.....	.....	3	6
OGDENSBURG (St. Lawrence Co.)	14,842	264	17.8	46	16	105	7	.....	.....	1	.....	.....	.....	5	.....	2	20	13
Gouverneur (St. Lawrence Co.)	6,848	98	14.3	17	4	51	3	.....	.....	.....	1	.....	1	5	.....	1	4	7
Potsdam (St. Lawrence Co.)	4,288	78	18.2	12	2	42	.....	.....	.....	.....	.....	.....	.....	3	.....	.....	4	4
Canton (St. Lawrence Co.)	6,962	117	16.8	14	3	62	2	.....	.....	.....	.....	.....	3	6	.....	.....	12	4
Malone (Franklin Co.)	6,694	108	16.1	23	6	51	2	1	.....	.....	.....	.....	2	3	1	.....	10	2
PLATTSBURG (Clinton Co.)	10,884	139	12.9	26	11	45	3	.....	.....	1	.....	.....	2	3	1	1	13	3
Glens Falls (Warren Co.)	15,464	229	14.8	35	9	98	7	.....	.....	.....	.....	2	1	2	2	.....	18	8
Whitehall (Washington Co.)	4,148	66	15.9	15	5	25	4	.....	.....	.....	.....	.....	.....	2	1	.....	1	4
Fort Edward (Washington Co.)	5,332	91	17.1	19	3	38	.....	.....	.....	.....	.....	.....	.....	3	1	.....	5	2
Sandy Hill (Washington Co.)	5,659	78	13.8	8	0	39	.....	.....	.....	.....	.....	.....	1	7	.....	.....	9	5
Granville (Washington Co.)	6,995	101	14.4	18	5	43	1	.....	.....	.....	.....	1	1	6	.....	.....	10	2
Greenwich (Washington Co.)	4,404	83	18.8	2	5	43	1	.....	.....	.....	.....	.....	.....	8	.....	2	10	6
Lowville (Lewis Co.)	3,991	66	16.5	2	5	44	.....	.....	.....	.....	.....	.....	1	.....	.....	1	4	2
Rest of District	278,552	4,097	14.7	595	179	1,869	66	5	.....	9	10	21	35	149	7	9	386	168
Totals for the District	413,456	6,302	15.2	964	293	2,801	108	6	.....	12	12	31	67	217	15	17	549	272
Totals for 1906	408,116	6,161	15.1	925	326	2,325	115	6	.....	19	12	36	67	24	22	31	550	278
MOHAWK VALLEY DISTRICT*																		

Johnstown (Fulton Co.)	9,845									4			1	3	2		12		
Gloversville (Fulton Co.)	18,800	140	15.2	14	7	77				1	1	2	1	6			12	11	
Little Falls (Herkimer Co.)	11,418	309	16.4	57	16	121	1							8		1	17	11	
Herkimer (Herkimer Co.)	7,012	180	15.8	30	4	66	1							4			9	8	
Ilion (Herkimer Co.)	6,238	93	13.3	18	4	42	1										6	5	
Utica (Oneida Co.)	65,550	92	14.7	13	5	36						1	5			1	6	1	
Whitestown (Oneida Co.)	7,159	1,260	19.2	281	76	384	10	1		3	4	7	18	10	4	3	122	56	
Rome (Oneida Co.)	17,726	101	14.1	31	5	32	1					1	3	2			11	1	
Boonville (Oneida Co.)	3,167	340	19.2	43	22	144	3			2	1	2	4	11	4	1	33	7	
Camden (Oneida Co.)	3,750	63	20.0	1	2	39	1				1			2			5	2	
Waterford (Saratoga Co.)	6,000	52	13.9	3	0	31								6			6	3	
Mechanicville (Saratoga Co.)	6,349	102	17.0	17	7	39	3			1	1	2		2			8	4	
Ballston Spa (Saratoga Co.)	4,213	94	14.8	22	14	20				1	1	3	1	3		2	6	1	
Saratoga Springs (Saratoga Co.)	13,235	61	14.5	7	3	30											5	3	
Rest of District	177,982	289	21.8	26	9	132	7					1	2	10	1		21	19	
		2,871	16.1	285	119	1,530	38			9	10	15	21	78	12	6	214	164	
Totals for the District	459,047	7,626	16.6	1,246	452	3,102	79	2		34	36	46	80	155	27	19	604	352	
Totals for 1906	444,740	7,230	16.3	1,223	408	2,620	88	4	1	10	50	54	106	10	25	43	523	310	
SOUTHERN TIER DISTRICT‡																			
Binghamton (Broome Co.)	43,787	673	15.4	110	44	256	8	2			1	5	13	10	1		44	29	
Owego (Tioga Co.)	5,010	102	20.4	8	2	64	2				1			2		1	5	7	
Candor (Tioga Co.)	3,148	50	15.9	5	1	32	3							2			1	4	
Waverly (Tioga Co.)	5,095	79	15.5	7	3	38	1						4	3			3	2	
Elmira (Chemung Co.)	35,734	564	15.8	74	36	202	10			2	12	3	12	19	2		46	25	
Horseheads (Chemung Co.)	4,826	76	15.7	8	1	48	1							1			6	2	
Hornell (Steuben Co.)	13,390	184	13.7	21	5	75	1			1		2		5			13	11	
Bath (Steuben Co.)	3,700	47	12.7	3	0	27								2		1	6		
Corning (Steuben Co.)	14,495	268	18.6	44	20	85	10			4		5	1	8		3	10	11	
Wellsville (Allegany Co.)	4,673	66	14.1	12	2	32	1							5	1		3	2	
Olean (Cattaraugus Co.)	10,443	138	13.3	19	10	39	2						8	1		4	9	5	
Salamanca (Cattaraugus Co.)	5,935	101	17.0	18	8	30	1			1			7	3			8	1	
Dunkirk (Chautauqua Co.)	16,702	265	15.9	74	22	64	12			1			3	5			20	7	
Jamestown (Chautauqua Co.)	27,466	310	11.3	42	5	117	5						2	6		1	19	17	
Westfield (Chautauqua Co.)	2,979	55	18.5	5	3	25	4			1				2		1		4	
Fredonia (Chautauqua Co.)	5,556	85	15.3	15	7	38		1		1	3			8	1		4	2	
Rest of District	239,793	3,846	16.0	380	87	2,059	29	6		17	5	8	38	158	8	11	203	220	
Totals for the District	442,732	6,909	15.6	845	256	3,231	90	9		28	22	23	88	240	13	22	400	349	
Totals for 1906	439,000	6,443	14.7	863	274	2,694	124	7		4	9	52	61	16	16	25	395	331	

*Includes Washington, Warren, Hamilton, Essex, Clinton, Franklin, St. Lawrence, Jefferson and Lewis counties.
†Includes Schenectady, Schoharie, Saratoga, Montgomery, Fulton, Herkimer and Oneida counties.
‡Includes Chautauqua, Cattaraugus, Allegany, Steuben, Chemung, Tioga, and Broome counties.
Cities are printed in SMALL CAPITALS, Villages in *Italics* and Towns in Roman type.

TOTAL MORTALITY FOR THE YEAR — (*Continued*).

SANITARY DISTRICTS.	Other general diseases.	Diseases of the nervous system.	Diseases of the circulatory system.	Pneumonia.	Other diseases of the respiratory system.	Diarrhœa and enteritis (under 2 years).	Other diseases of the digestive system.	Bright's disease.	Other diseases of the genito-urinary system.	The puerperal state.	Diseases of the skin.	Diseases of the organs of locomotion.	Malformations.	Early infancy (under 3 months).	Old age (60 years and over).	External causes.	Ill-defined diseases.	Births. Total births.	Births. Annual birth rate per 1,000 population.	Births. Still births.
ADIRONDACK AND NORTHERN DISTRICT*																				
WATERTOWN (Jefferson Co.)	29	49	46	46	21	34	45	16	17	5	3	....	2	37	9	31	6	538	20.0	27
Ellisburg (Jefferson Co.)	3	14	6	7	2	2	10	6	1	.....	2	....	....	8	1	2	1	64	17.1	2
Carthage (Jefferson Co.)	2	8	6	2	1	1	6	1	2	2	....	....	1	3	6	4	.....	68	18.9	1
Clayton (Jefferson Co.)	5	7	6	3	2	.....	5	3	3	1	....	....	1	1	1	.....	.....	77	18.8	0
OGDENSBURG (St. Lawrence Co.)	12	37	35	17	13	22	21	20	2	3	2	....	1	15	8	7	1	287	19.3	13
Gouverneur (St. Lawrence Co.)	8	17	10	3	5	4	5	1	4	1	....	....	3	6	2	6	1	123	18.0	4
Potsdam (St. Lawrence Co.)	3	10	14	7	2	3	2	3	3	1	1	....	2	4	7	5	.....	80	18.7	3
Canton (St. Lawrence Co.)	10	15	10	5	4	4	5	8	2	5	2	....	1	6	8	5	.....	108	15.5	4
Malone (Franklin Co.)	8	10	16	6	7	7	5	10	4	.....	....	....	.....	5	3	6	.....	121	18.1	3
PLATTSBURG (Clinton Co.)	9	22	16	9	7	16	12	2	1	2	....	....	2	1	6	3	4	250	23.1	1
Glens Falls (Warren Co.)	18	33	31	14	10	8	14	14	4	2	1	....	4	19	5	12	.....	269	17.4	5
Whitehall (Washington Co.)	1	6	7	5	2	5	5	7	1	.....	1	....	.....	7	.....	7	.....	113	27.3	7
Fort Edward (Washington Co.)	5	12	10	7	5	3	2	5	4	3	....	....	1	13	1	9	.....	115	21.6	7
Sandy Hill (Washington Co.)	3	15	4	6	2	1	8	4	3	1	2	....	.....	4	1	2	.....	80	14.1	5
Granville (Washington Co.)	8	7	7	16	5	5	3	14	2	.....	....	....	3	4	1	4	1	134	19.2	3
Greenwich (Washington Co.)	4	8	5	6	4	1	6	5	4	2	....	....	1	.....	2	7	1	58	13.2	1
Lowville (Lewis Co.)	5	10	12	6	2	.....	7	6	2	.....	....	1	.....	1	4	2	.....	43	10.8	0
Rest of District	206	534	482	348	181	108	315	212	98	42	33	8	22	214	174	228	24	.....	.....	.....
Totals for the District	339	814	723	513	277	224	476	337	157	70	47	9	44	348	239	340	39	.....	.....	.....
Totals for 1906	507	782	791	458	207	209	466	280	100	56	19	3	16	301	409	346	51	.....	.....	.....
MOHAWK VALLEY DISTRICT†	53	98	78	89	66	107	78	58	23	11	5	....	10	66	17	76	11	1,954	28.3	88
SCHENECTADY (Schenectady Co.)	5	4	7	7	2	1	2	1	.....	.....	.....	....	.....	2	5	3	.....	47	12.6	3
Cobleskill (Schoharie Co.)	31	50	37	38	32	37	29	23	8	4	5	1	2	21	3	31	4	562	22.5	10
AMSTERDAM (Montgomery Co.)	2	7	6	8	1	.....	6	5	.....	.....	.....	....	.....	10	3	3	4	451	16.9	2
Fort Plain (Montgomery Co.)																				

GLOVERSVILLE (Fulton Co.)	11	20	23	9	7	10	13	10	5	2	...	...	3	7	4	4	1	111	15.8	1
LITTLE FALLS (Herkimer Co.)	3	15	8	4	8	6	6	2	5	2	2	...	3	1	4	4	1	111	15.8	1
Herkimer (Herkimer Co.)	7	16	15	8	2	2	3	7	3	...	...	...	3	4	1	7	...	99	15.9	7
Ilion (Herkimer Co.)	78	146	130	98	61	78	101	85	48	12	10	3	13	68	17	65	9	1,527	23.3	103
UTICA (Oneida Co.)	6	10	8	8	4	15	9	1	2	...	1	...	...	9	1	7	1	136	19.4	4
Whitestown (Oneida Co.)	14	36	57	16	11	14	25	20	9	2	3	...	3	17	15	27	3	434	24.5	14
ROME (Oneida Co.)	5	12	16	8	2	...	1	2	1	...	...	...	...	...	3	2	...	54	17.1	3
Boonville (Oneida Co.)	2	5	8	3	1	1	5	5	2	1	...	...	...	1	...	3	...	48	12.3	1
Camden (Oneida Co.)	2	23	10	9	6	3	8	7	1	...	...	...	2	3	1	4	2	94	15.7	0
Waterford (Saratoga Co.)	4	12	6	6	7	2	7	6	4	...	2	...	1	11	...	8	...	181	28.5	8
Mechanicville (Saratoga Co.)	6	7	6	8	2	5	3	6	4	...	...	...	1	1	4	...	...	70	16.6	0
Ballston Spa (Saratoga Co.)	12	27	40	28	16	5	26	32	5	3	1	...	3	12	3	15	...	251	19.0	23
Saratoga Springs (Saratoga Co.)	153	409	342	237	128	57	196	248	50	20	32	4	10	105	119	177	17	.....	.....	.....
Rest of District																				
Totals for the District	432	975	861	610	387	357	558	538	183	60	64	8	56	366	211	469	57	.....	.....	.....
Totals for 1906	501	924	893	556	290	322	598	426	143	62	33	5	16	331	399	441	66	.....	.....	.....
SOUTHERN TIER DISTRICT‡																				
BINGHAMTON (Broome Co.)	30	91	80	49	36	20	58	55	22	9	...	...	13	44	12	35	6	851	19.4	41
Owego (Tioga Co.)	5	19	15	9	7	2	4	10	1	...	1	...	1	...	3	7	...	57	11.4	1
Candor (Tioga Co.)	4	8	5	1	2	...	6	3	2	...	2	...	...	2	5	...	...	42	13.3	1
Waverly (Tioga Co.)	2	13	8	4	8	3	5	5	3	...	1	...	...	3	1	9	1	85	16.7	3
ELMIRA (Chemung Co.)	31	61	59	25	29	35	39	55	24	2	2	...	1	24	8	38	...	551	15.4	38
Horseheads (Chemung Co.)	4	16	9	8	...	3	7	5	1	1	...	...	...	2	4	6	...	48	9.9	4
HORNELL (Steuben Co.)	15	20	29	16	10	5	12	6	3	4	...	...	1	10	2	17	1	240	17.9	13
Bath (Steuben Co.)	...	10	7	...	2	...	4	4	1	...	...	...	...	2	3	5	...	45	12.2	0
CORNING (Steuben Co.)	9	27	28	27	10	12	29	8	11	4	3	1	1	13	8	21	4	273	19.0	9
Wellsville (Allegany Co.)	5	6	7	3	7	...	4	2	...	3	...	...	1	8	3	5	...	62	13.3	3
OLEAN (Cattaraugus Co.)	7	17	12	13	3	2	10	10	2	1	1	...	...	10	3	17	1	215	20.7	3
Salamanca (Cattaraugus Co.)	9	13	12	6	5	4	3	5	...	1	...	...	4	4	3	10	1	143	24.1	0
DUNKIRK (Chautauqua Co.)	13	21	26	32	8	20	35	10	7	3	1	...	2	15	1	20	3	571	34.2	16
JAMESTOWN (Chautauqua Co.)	16	43	32	21	14	6	27	21	12	2	2	...	5	15	17	26	1	568	20.7	19
Westfield (Chautauqua Co.)	1	4	4	4	7	2	2	5	2	1	...	...	1	1	2	6	1	48	16.1	1
Fredonia (Chautauqua Co.)	4	19	14	2	6	...	2	1	2	2	...	...	3	5	1	4	...	130	23.4	...
Rest of District	206	551	597	275	173	60	300	251	108	35	39	2	25	136	151	212	22	.....	.....	11
Totals for the District	361	939	944	495	327	174	547	456	201	68	52	3	58	294	227	438	41	.....	.....	.....
Totals for 1906	305	874	935	389	242	241	508	356	145	49	31	4	15	249	430	383	47	.....	.....	.....

*Includes Washington, Warren, Hamilton, Essex, Clinton, Franklin, St. Lawrence, Jefferson and Lewis counties.
†Includes Schenectady, Schoharie, Saratoga, Montgomery, Fulton, Herkimer and Oneida counties.
‡Includes Chautauqua, Cattaraugus, Allegany, Steuben, Chemung, Tioga and Broome counties.
Cities are printed in SMALL CAPS, Villages in *Italics* and Towns in Roman type.

TOTAL MORTALITY FOR THE YEAR — (*Continued*).

SANITARY DISTRICTS.	Estimated population.	Total deaths.	Annual death rate per 1,000 population.	Ages.			Epidemic Diseases.										Pulmonary tuberculosis.	Cancer.
				Deaths under one year of age.	Deaths 1 to 5 years of age.	Deaths at 60 years and over.	Typhoid fever.	Malarial diseases.	Smallpox.	Measles.	Scarlatina.	Whooping cough.	Diphtheria and croup.	Influenza.	Erysipelas.	Cerebrospinal meningitis.		
EAST CENTRAL DISTRICT*																		
SYRACUSE (Onondaga Co.)	121,153	1,916	15.8	399	98	591	14	.....	.....	5	4	2	30	20	8	7	148	92
Baldwinsville (Onondaga Co)	2,961	41	13.8	4	0	27	1	.....	.....	.....	.....	.....	.....	3	.....	.....	2	1
De Witt (Onondaga Co.)	6,578	101	15.4	19	1	48	2	.....	.....	.....	.....	.....	1	3	.....	1	2	.....
CORTLAND (Cortland Co.)	12,174	155	12.9	15	3	76	3	.....	.....	.....	1	.....	2	2	.....	.....	11	9
Homer (Cortland Co.)	2,598	48	18.5	4	2	30	1	.....	.....	.....	.....	.....	.....	4	.....	.....	3	.....
ONEIDA (Madison Co.)	8,772	128	14.7	13	7	63	.....	.....	.....	.....	.....	.....	1	4	1	.....	11	8
Hamilton (Madison Co.)	3,614	66	18.3	5	3	45	.....	.....	.....	.....	.....	.....	1	1	.....	.....	1	6
Cazenovia (Madison Co.)	3,557	51	14.3	3	2	36	.....	.....	.....	.....	.....	.....	.....	2	.....	.....	1	2
Canastota (Madison Co.)	3,328	66	19.8	11	0	29	1	.....	.....	.....	.....	.....	.....	2	.....	.....	5	.....
Norwich (Chenango Co.)	7,653	135	17.6	13	11	60	.....	.....	.....	.....	6	.....	1	4	1	.....	7	10
Oneonta (Otsego Co.)	8,416	164	19.5	20	3	78	2	.....	.....	.....	.....	.....	1	2	.....	.....	5	10
Worcester (Otsego Co.)	2,328	41	17.6	0	2	31	1	.....	.....	.....	.....	.....	.....	8	.....	.....	.....	3
Cooperstown (Otsego Co.)	2,476	41	16.6	3	1	26	.....	.....	.....	.....	.....	.....	.....	1	.....	1	.....	2
Walton (Delaware Co.)	5,046	62	12.3	7	1	35	3	.....	.....	.....	.....	.....	.....	2	.....	.....	2	3
Sidney (Delaware Co.)	4,437	62	14.0	2	2	33	3	.....	.....	.....	.....	.....	1	3	.....	.....	2	5
Liberty (Sullivan Co.)	5,849	153	26.2	6	5	25	1	.....	.....	.....	.....	.....	2	.....	.....	.....	84	4
Rest of District	218,519	3,459	15.8	312	108	2,019	47	2	.....	1	9	7	24	192	6	7	242	182
Totals for the District	419,459	6,689	15.9	836	249	3,252	79	2	.....	6	20	9	64	253	16	16	526	337
Totals for 1906	414,200	6,371	15.4	843	281	2,604	59	1	.....	19	26	56	44	13	10	23	491	345
WEST CENTRAL DISTRICT†																		
AUBURN (Cayuga Co.)	32,963	531	16.1	70	31	200	2	.....	.....	.....	1	.....	15	4	.....	6	41	32
ITHACA (Tompkins Co.)	15,205	242	16.1	27	11	100	.....	.....	.....	.....	.....	.....	2	3	.....	1	10	14

Penn Yan (Yates Co.)	5	12	14	6	5	1	5	2	.....	.....	.....	.....	.....	2	9	6	.....	22	4.9	2
Batavia (Genesee Co.)	10	17	14	12	5	5	16	10	3	1	3	.....	4	7	8	18	1	169	16.3	8
Le Roy (Genesee Co.)	3	11	9	3	3	.....	6	3	4	1	.....	.....	.....	1	3	1	.....	86	24.6	3
Dansville (Livingston Co.)	8	16	8	1	2	1	4	3	2	1	.....	.....	1	.....	3	3	.....	49	12.7	0
Warsaw (Wyoming Co.)	4	9	10	3	1	.....	1	.....	1	.....	.....	.....	1	1	3	2	1	56	12.4	1
Rest of district	159	546	461	216	152	61	266	206	77	27	19	3	19	93	140	201	16	.....	.....	.....
Totals for the District	277	821	697	336	248	118	403	328	124	43	36	7	41	158	208	330	24	.....	.....	.....
Totals for 1906	372	729	752	320	160	179	399	217	101	38	23	2	10	155	357	313	22	.....	.....	.....
LAKE ONTARIO AND WESTERN DISTRICT‡																				
BUFFALO (Erie Co.)	372	550	670	238	505	292	558	238	155	115	3	9	44	440	246	445	307	8,891	23.0	458
TONAWANDA (Erie Co.)	5	17	11	5	7	1	10	12	3	2	1	.....	.....	6	2	8	.....	153	19.1	5
Amherst (Erie Co.)	1	6	5	4	5	2	6	3	3	.....	1	.....	.....	2	2	4	.....	86	18.7	3
NORTH TONAWANDA (Niagara Co.)	2	24	15	3	12	9	8	4	2	3	.....	.....	1	18	2	8	.....	295	27.9	15
LOCKPORT (Niagara Co.)	14	38	43	16	11	6	20	21	5	.....	2	.....	3	9	13	22	.....	315	17.6	16
NIAGARA FALLS (Niagara Co.)	28	50	35	44	23	64	34	18	5	5	2	.....	2	36	5	51	8	618	21.0	27
Medina (Orleans Co.)	4	11	7	6	3	2	6	5	1	1	.....	.....	.....	5	4	8	1	103	19.5	2
Albion (Orleans Co.)	5	9	11	3	7	6	5	2	.....	.....	.....	.....	.....	2	2	3	.....	106	19.4	1
Brockport (Monroe Co.)	4	7	6	1	6	1	4	1	.....	1	2	.....	.....	4	5	1	1	62	16.7	.....
ROCHESTER (Monroe Co.)	153	329	332	206	226	127	246	231	91	38	22	8	32	67	85	170	17	4,123	21.8	197
Palmyra (Wayne Co.)	6	8	4	4	5	1	2	2	2	1	.....	.....	.....	2	2	5	.....	69	16.6	2
Newark (Wayne Co.)	5	14	13	3	3	2	5	3	1	.....	1	.....	1	2	2	8	2	101	22.2	6
Lyons (Wayne Co.)	8	8	6	3	3	3	6	5	1	.....	.....	.....	1	1	2	8	1	61	12.3	5
Clyde (Wayne Co.)	5	6	9	2	1	.....	1	4	.....	.....	.....	.....	.....	3	.....	2	1	60	23.3	4
OSWEGO (Oswego Co.)	21	51	40	22	12	16	39	29	10	6	.....	1	4	23	7	19	3	433	19.1	11
FULTON (Oswego Co.)	10	13	12	2	3	5	9	10	1	3	1	.....	3	12	4	10	.....	186	20.7	8
Richland (Oswego Co.)	3	12	5	.....	1	2	3	4	3	.....	.....	.....	.....	3	2	3	.....	65	17.8	1
Rest of District	223	591	535	287	241	173	297	190	84	25	38	4	34	173	176	339	14	.....	.....	.....
Totals for the District	869	1,744	1,759	849	1,074	712	1,259	782	367	200	73	22	125	808	561	1,113	355	.....	.....	.....
Totals for 1906	258	1,695	1,800	882	713	841	1,067	705	322	182	28	8	33	524	692	1,087	77	.....	.....	.....
§Delayed returns	20	71	59	24	18	8	35	33	5	3	2	....	4	24	20	43	1	.....	.....	.....
Totals for the State	7,831	14,539	16,952	11,014	11,649	9,213	9,035	9,244	2,919	1,413	701	187	1,138	7,025	2,723	9,668	1,449	.....	.....	.....
Average for past five years	18,224	13,432	14,140	14,340	5,373	8,331	7,856	6,762	1,808	1,223	....	....	.....	.....	4,817	8,150	.....	.....	.....	.....
Totals for 1906	12,094	13,521	15,395	15,333	4,663	8,578	8,741	8,984	2,360	1,326	379	105	497	4,606	4,332	8,874	1,263	.....	.....	.....

* Includes Sullivan, Delaware, Otsego, Madison, Chenango, Onondaga and Cortland counties.
† Includes Cayuga, Tompkins, Seneca, Schuyler, Ontario, Yates, Livingston, Genesee and Wyoming counties.
‡ Includes Oswego, Wayne, Monroe, Orleans, Niagara and Erie counties.
Cities are printed in SMALL CAPITALS, Villages in *Italic* and Towns in Roman type.
§ Received after statistics were closed for December.

SUMMARY OF MORTALITY IN THE SANITARY DISTRICTS, 1907.*

SANITARY DISTRICTS.	Total deaths.	Rate per 1,000 of population.	AGES.			EPIDEMIC DISEASES.									
			Deaths under 1 year of age.	Deaths 1 to 5 years of age.	Deaths at 60 years and over.	Typhoid fever.	Malarial diseases.	Smallpox.	Measles.	Scarlatina.	Whooping cough.	Diphtheria and croup.	Influenza.	Erysipelas.	Cerebro-spinal meningitis.
Maritime	86,155	18.4	18,795	8,849	18,488	808	89	9	743	823	450	1,842	812	315	26
Hudson Valley	12,925	18.2	1,871	680	5,181	194	22	.....	52	36	80	225	289	26	44
Adirondack and Northern	6,302	15.2	964	290	2,801	108	6	.....	12	12	31	67	217	15	17
Mohawk Valley	7,626	16.6	1,246	452	3,102	79	2	.....	34	36	46	80	155	27	19
Southern Tier	6,909	15.6	845	256	3,231	90	9	.....	28	22	23	88	240	13	22
East Central	6,689	15.9	836	249	3,252	79	2	.....	6	20	9	64	253	16	16
West Central	5,209	16.6	503	188	2,722	45	3	.....	12	15	27	47	176	20	20
Lake Ontario and Western	15,627	16.0	2,894	1,178	5,577	265	3	1	108	65	122	187	230	51	61

* This table does not include the 448 delayed returns.

[illegible]	5	12	14	6	6	1	5	2	.....	.....	.....	.....	.....	2	9	6	.....	22	4.9	2
Penn Yan (Yates Co.)	10	17	14	12	3	3	16	10	3	1	3	.....	4	7	8	18	1	109	16.3	8
Batavia (Genesee Co.)	3	11	9	3	3	.....	6	3	4	1	.....	.....	.....	1	3	1	.....	86	24.6	3
Le Roy (Genesee Co.)	8	16	8	1	2	1	4	3	2	1	.....	.....	1	.....	3	3	.....	49	12.7	0
Dansville (Livingston Co.)	4	9	10	3	1	.....	1	.....	1	.....	.....	.....	1	1	3	2	1	56	12.4	1
Warsaw (Wyoming Co.)	159	546	461	216	152	61	266	206	77	27	19	3	19	93	140	201	16	.....	.....	.....
Rest of district																				
Totals for the District	277	821	697	336	248	118	403	328	124	43	36	7	41	158	208	330	24	.....	.....	.....
Totals for 1906	372	729	752	320	160	179	399	217	101	38	23	2	10	155	357	313	22	.....	.....	.....
LAKE ONTARIO AND WESTERN DISTRICT‡																				
BUFFALO (Erie Co.)	372	550	670	238	505	292	558	238	155	115	3	9	44	440	246	447	307	8,891	23.0	458
TONAWANDA (Erie Co.)	5	17	11	5	7	1	10	12	3	2	1	.....	.....	6	2	8	.....	153	19.1	5
Amherst (Erie Co.)	1	6	5	4	5	2	6	3	3	.....	1	.....	.....	2	2	4	.....	86	18.7	3
NORTH TONAWANDA (Niagara Co.)	2	24	15	3	12	9	8	4	2	3	.....	.....	1	18	2	8	.....	295	27.9	15
LOCKPORT (Niagara Co.)	14	38	43	16	11	6	20	21	5	.....	2	.....	3	9	13	22	.....	315	17.6	16
NIAGARA FALLS (Niagara Co.)	28	50	35	44	23	64	34	18	5	5	2	.....	2	36	5	51	8	618	21.0	27
Medina (Orleans Co.)	4	11	7	6	3	2	6	5	1	1	.....	.....	.....	5	4	8	1	103	19.5	2
Albion (Orleans Co.)	5	9	11	3	7	6	5	2	.....	.....	.....	.....	.....	2	2	3	.....	106	19.4	1
Brockport (Monroe Co.)	4	7	6	1	6	1	4	1	.....	.....	1	2	.....	4	5	1	1	62	16.7	.....
ROCHESTER (Monroe Co.)	153	329	332	206	226	127	246	231	91	38	22	8	32	67	85	170	17	4,123	21.8	197
Palmyra (Wayne Co.)	6	8	4	4	5	1	2	2	2	1	.....	.....	.....	2	2	5	.....	69	16.6	2
Newark (Wayne Co.)	5	14	13	3	3	2	5	3	1	.....	1	.....	1	2	2	8	2	101	22.2	6
Lyons (Wayne Co.)	8	8	6	3	3	3	6	5	1	.....	.....	.....	1	1	2	8	1	61	12.3	5
Clyde (Wayne Co.)	5	6	9	2	1	.....	1	4	.....	.....	.....	.....	.....	3	.....	3	1	60	23.3	4
OSWEGO (Oswego Co.)	21	51	40	22	12	16	39	29	10	6	.....	1	4	23	7	19	3	433	19.1	11
FULTON (Oswego Co.)	10	13	12	2	3	5	9	10	1	3	1	.....	3	12	4	10	.....	186	20.7	8
Richland (Oswego Co.)	3	12	5	.....	1	2	3	4	3	.....	.....	.....	.....	3	2	3	.....	65	17.8	1
Rest of District	223	591	535	287	241	173	297	190	84	25	38	4	34	173	176	339	14	.....	.....	.....
Totals for the District	869	1,744	1,759	849	1,074	712	1,259	782	367	200	73	22	125	808	561	1,113	355	.....	.....	.....
Totals for 1906	258	1,695	1,800	882	713	841	1,067	705	322	182	28	8	33	524	692	1,087	77	.....	.....	.....
§Delayed returns	20	71	59	24	18	8	35	33	5	3	2	.....	4	24	20	43	1	.....	.....	.....
Totals for the State	7,831	14,539	16,952	11,014	11,649	9,213	9,035	9,244	2,919	1,413	701	187	1,138	7,025	2,723	9,668	1,449	.....	.....	.....
Average for past five years	18,224	13,432	14,140	14,340	5,373	8,331	7,856	6,762	1,808	1,223	.....	.....	.....	.....	4,817	8,150	.....	.....	.....	.....
Totals for 1906	12,094	13,521	15,395	15,333	4,663	8,578	8,741	8,984	2,360	1,326	379	105	497	4,606	4,332	8,874	1,263	.....	.....	.....

* Includes Sullivan, Delaware, Otsego, Madison, Chenango, Onondaga and Cortland counties.
† Includes Cayuga, Tompkins, Seneca, Schuyler, Ontario, Yates, Livingston, Genesee and Wyoming counties.
‡ Includes Oswego, Wayne, Monroe, Orleans, Niagara and Erie counties.
Cities are printed in SMALL CAPITALS, Villages in *Italic* and Towns in Roman type.
§ Received after statistics were closed for December.

SUMMARY OF MORTALITY IN THE SANITARY DISTRICTS, 1907.*

SANITARY DISTRICTS.	Total deaths.	Rate per 1,000 of population.	AGES.			EPIDEMIC DISEASES.									
			Deaths under 1 year of age.	Deaths 1 to 5 years of age.	Deaths at 60 years and over.	Typhoid fever.	Malarial diseases.	Smallpox.	Measles.	Scarlatina.	Whooping cough.	Diphtheria and croup.	Influenza.	Erysipelas.	Cerebro-spinal meningitis.
Maritime	86,155	18.4	18,795	8,849	18,488	808	89	9	743	823	450	1,842	812	315	26
Hudson Valley	12,925	18.2	1,871	680	5,181	194	22	.....	52	36	80	225	289	26	44
Adirondack and Northern	6,302	15.2	964	290	2,801	108	6	.....	12	12	31	67	217	15	17
Mohawk Valley	7,626	16.6	1,246	452	3,102	79	2	.....	34	36	46	80	155	27	19
Southern Tier	6,909	15.6	845	256	3,231	90	9	.....	28	22	23	88	240	13	22
East Central	6,689	15.9	836	249	3,252	79	2	.....	6	20	9	64	253	16	16
West Central	5,209	16.6	503	188	2,722	45	3	.....	12	15	27	47	176	20	20
Lake Ontario and Western	15,627	16.0	2,894	1,178	5,577	265	3	1	108	65	122	187	230	51	61

* This table does not include the 448 delayed returns.

SUMMARY OF MORTALITY IN THE SANITARY DISTRICTS, 1907 — (*Concluded*).

SANITARY DISTRICTS.	Pulmonary tuberculosis.	Cancer.	Unclassified general diseases.	Diseases of the nervous system.	Diseases of the circulatory system.	Pneumonia.	Other diseases of the respiratory system.	Diarrhea and enteritis, under 2 years.	Other diseases of the digestive system.	Bright's disease.	Other diseases of the genito-urinary system.	The puerperal state.	Diseases of the skin.	Diseases of the organs of locomotion.	Malformations.	Early infancy (under 3 months).	Old age (60 years and over).	External causes.	Ill-defined diseases.
Maritime	9,590	3,514	4,514	6,576	9,491	6,746	8,235	6,846	4,421	5,487	1,405	837	267	116	706	4,220	766	5,729	772
Hudson Valley	1,235	571	610	1,760	1,531	995	732	525	859	857	307	83	94	16	68	517	291	780	126
Adirondack and Northern	549	272	339	814	723	513	277	224	476	337	157	70	47	9	44	348	239	340	39
Mohawk Valley	604	352	432	975	861	610	387	357	558	538	183	60	64	8	56	366	211	469	57
Southern Tier	400	349	361	939	944	495	327	174	547	456	201	68	52	3	58	294	227	438	41
East Central	526	337	409	839	887	446	351	249	477	426	170	49	66	6	36	290	200	426	34
West Central	357	288	277	821	697	336	248	118	403	328	124	43	36	7	41	155	208	330	24
Lake Ontario and Western	1,145	717	869	1,744	1,759	849	1,074	712	1,259	782	367	200	73	22	125	808	561	1,113	355

MORTALITY IN THE SANITARY DISTRICTS 1885–1907 — MARITIME DISTRICT.

YEAR.	All deaths.	Death rate.	Deaths under five years of age.	EPIDEMIC DISEASES.									
				Cerebro-spinal menin-gitis.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysip-elas.	Whoop-ing-cough.	Diph-theria.	Diar-rhea.
1885	55 021	.....	22 436	233	488	718	28	989	948	230	694	3,207	5,828
1886	57,420	.....	24 668	246	483	687	37	790	790	223	880	4,103	5,243
1887	61,715	.....	25 289	232	528	658	171	933	988	217	283	4,654	6,501
1888	64,421	.....	27 513	201	558	519	153	2,012	670	240	820	4,378	5,900
1889	65,037	.....	27 691	243	638	468	.....	1,661	700	209	993	4,098	5,596
1890	67,512	.....	26 781	170	625	444	2	562	972	216	681	3,314	5,576
1891	74,681	.....	30 620	311	658	381	1	1,858	940	243	678	3,466	6,146
1892	74,590	.....	30 905	364	634	412	142	1,499	1,093	278	640	3,573	6,422
1893	75,027	.....	29 561	652	657	337	252	939	538	227	905	3,837	5,998
1894	71,055	.....	29 826	254	561	300	281	784	829	206	594	5,066	5,647
1895	74,246	21.2	30 303	335	566	281	11	626	1,023	238	853	3,830	5,992
1896	75,789	21.5	29,122	291	594	333	3	566	1,106	200	722	3,403	5,413
1897	67,646	18.9	25,804	332	535	285	27	726	621	192	508	2,881	4,744
1898	71,196	20.0	26 908	401	724	296	1	727	529	150	801	1,786	5,285
1899	70,384	18.4	25 751	414	578	185	18	550	600	241	565	2,008	3,905
1900	75,989	19.5	27 625	310	760	240	11	479	863	325	616	2,393	4,292
1901	76,030	20.0	25,649	257	775	222	426	1,178	469	208	334	2,147	7,114
1902	73,325	18.6	25,494	264	809	138	322	968	737	193	661	2,111	6,187
1903	73,011	18.0	22,926	271	697	100	7	758	520	205	376	2,262	5,465
1904	84,164	20.0	28,445	1,432	726	111	9	877	916	265	227	2,189	6,322
1905	79,671	18.2	26,173	2,142	714	67	9	484	552	269	454	1,652	6,593
1906	82,544	18.2	27,427	846	689	85	6	513	1,184	313	434	1,971	6,135
1907	86,155	18.4	27,644	26	808	89	9	823	743	315	450	1,842	6,846

MORTALITY IN THE SANITARY DISTRICTS 1885–1907 — HUDSON VALLEY DISTRICT — (Concluded).

YEAR.	OTHER CAUSES OF DEATH.										
	Consumption.	Acute respiratory. diseases.	Puerperal.	Digestive.	Urinary.	Circulatory.	Nervous.	Cancer.	Violence.	Old age.	Unclassified.
1885	1,295	1,059	99	496	370	717	1,216	238	333	523	767
1886	1,330	1,167	99	706	370	844	964	232	386	722	798
1887	1,331	946	107	642	326	957	955	233	413	1,187	801
1888	1,258	1,230	85	674	415	900	1,152	264	412	1,417	965
1889	1,454	1,310	83	725	453	1,043	1,134	291	425	1,090	815
1890	1,329	747	74	818	528	1,002	1,401	292	411	841	833
1891	1,343	2,053	81	912	545	1,045	1,539	300	505	990	957
1892	1,369	2,167	104	867	587	1,069	1,687	330	561	894	1,093
1893	1,244	1,827	114	872	600	1,117	1,577	356	536	853	1,091
1894	1,305	1,570	90	816	731	997	1,512	332	542	796	1,180
1895	1,298	1,696	79	823	711	1,026	1,634	356	476	805	1,184
1896	1,414	1,574	52	876	715	1,119	1,649	404	577	766	1,125
1897	1,316	1,755	78	863	783	1,241	1,632	425	521	765	1,056
1898	1,258	1,492	82	827	772	1,254	1,719	419	578	785	1,025
1899	1,313	1,541	62	822	756	1,251	1,646	415	582	765	1,227
1900	1,373	1,606	75	857	781	1,276	1,668	476	531	731	1,193
1901	1,342	1,519	87	968	774	1,324	1,657	456	657	720	1,186
1902	1,180	1,279	61	837	811	1,458	1,493	497	629	594	1,092
1903	1,259	1,391	73	847	939	1,556	1,509	536	707	586	1,209
1904	1,346	1,403	68	959	941	1,542	1,617	535	660	624	1,510
1905	1,286	1,401	88	951	948	1,506	1,591	549	802	600	1,378
1906	1,126	1,531	81	916	966	1,495	1,524	580	702	523	1,544
1907	1,235	1,727	83	859	1,164	1,531	1,760	571	780	291	1,720

MORTALITY IN THE SANITARY DISTRICTS 1885–1907 — ADIRONDACK AND NORTHERN DISTRICT.

YEAR.	All deaths.	Death rate.	Deaths under five years of age.	EPIDEMIC DISEASES.									
				Cerebro-spinal menin-gitis.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysip-elas.	Whoop-ing cough.	Diph-theria.	Diar-rhea.
1885	2,428	.....	626	20	47	12	1	19	11	11	28	175	113
1886	2 479	.....	616	25	51	5	.....	19	18	9	40	110	144
1887	2 969	.....	710	36	71	11	.....	28	16	19	20	147	189
1888	3 43	.....	823	36	63	10	3	39	30	8	8	160	208
1889	3,129	.....	735	13	72	15	.....	9	16	6	34	106	194
1890	3,825	.....	795	19	51	12	.....	12	25	10	32	145	166
1891	4 31	.....	888	23	81	18	.....	23	10	12	12	141	286
1892	4 534	.....	924	34	89	13	.....	23	50	15	23	133	208
1893	4 367	.....	881	13	89	9	.....	43	14	11	41	177	186
1894	4 35	.....	890	29	100	4	.....	25	6	18	31	123	255
1895	4 263	13.0	904	18	108	4	.....	29	2	9	22	79	226
1896	4 447	13.0	862	29	77	.....	.....	24	41	15	16	121	237
1897	5 257	14.5	1,011	23	96	6	.....	6	27	11	28	132	240
1898	5 187	14.7	984	27	122	5	.....	3	30	9	43	59	307
1899	5 332	14.0	994	37	139	4	.....	19	2	10	44	54	270
1900	5 430	14.2	1,083	36	152	5	.....	23	48	25	24	74	393
1901	5 611	14.0	1,155	31	97	3	4	35	83	22	36	93	229
1902	4 98	13.0	937	30	99	5	9	28	25	14	24	46	167
1903	5 305	13.4	927	26	112	3	2	22	14	18	18	57	204
1904	5 728	14.5	1,056	27	128	.....	1	29	3	15	32	65	131
1905	5 996	15.0	1,266	31	109	3	.....	11	67	11	68	42	258
1906	6 61	15.1	1,251	31	115	6	.....	12	19	22	36	67	209
1907	6 302	15.2	1,254	17	108	6	.....	12	12	15	31	67	224

YEAR.	OTHER CAUSES OF DEATH.										
	Consumption.	Acute respiratory diseases.	Puerperal.	Digestive.	Urinary.	Circulatory.	Nervous.	Cancer.	Violence.	Old age.	Unclassified.
1885	359	268	38	149	84	209	253	66	89	217	269
1886	342	220	51	177	93	193	262	92	92	323	212
1887	366	236	32	169	79	182	253	112	106	626	268
1888	381	371	48	226	78	221	317	94	102	743	290
1889	381	330	32	216	117	237	364	110	114	484	289
1890	415	554	38	298	130	287	370	115	132	454	370
1891	460	478	37	323	171	388	433	128	177	556	388
1892	482	603	38	356	174	439	518	133	178	567	458
1893	459	561	44	340	197	402	508	157	163	523	430
1894	510	504	47	326	225	435	514	145	165	501	472
1895	488	459	55	323	195	445	532	173	179	480	437
1896	520	453	35	338	248	472	561	192	215	432	426
1897	571	672	50	377	321	594	627	213	241	539	483
1898	581	551	55	436	304	567	678	212	239	502	462
1899	525	693	39	404	319	552	669	212	207	586	549
1900	539	616	46	399	318	573	678	234	231	470	546
1901	564	703	45	441	322	627	708	208	249	483	628
1902	521	459	42	399	311	591	681	229	262	469	570
1903	493	515	46	446	342	676	685	239	270	480	637
1904	552	545	55	415	351	790	754	255	289	452	839
1905	583	614	65	500	376	717	682	288	314	486	771
1906	550	689	56	466	380	791	782	278	346	409	897
1907	549	790	70	476	494	723	814	272	340	239	1,043

MORTALITY IN THE SANITARY DISTRICTS 1885–1907 — ADIRONDACK AND NORTHERN DISTRICT.

YEAR.	All deaths.	Death rate.	Deaths under five years of age.	EPIDEMIC DISEASES.									
				Cerebro-spinal menin-gitis.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysip-elas.	Whoop-ing cough.	Diph-theria.	Diar-rhea.
1885	2,428	.....	626	20	47	12	1	19	11	11	28	175	113
1886	2,479	.....	616	25	51	5	.....	19	18	9	40	110	144
1887	2,969	.....	710	36	71	11	.....	28	16	19	20	147	189
1888	3,435	.....	823	36	63	10	3	39	30	8	8	160	208
1889	3,129	.....	735	13	72	15	.....	9	16	6	34	106	194
1890	3,825	.....	795	19	51	12	.....	12	25	10	32	145	166
1891	4,131	.....	888	23	81	18	.....	23	10	12	12	141	286
1892	4,534	.....	924	34	89	13	.....	23	50	15	23	133	208
1893	4,367	.....	881	13	89	9	.....	43	14	11	41	177	186
1894	4,435	.....	890	29	100	4	.....	25	6	18	31	123	255
1895	4,263	13.0	904	18	108	4	.....	29	2	9	22	79	226
1896	4,447	13.0	862	29	77	.....	.....	24	41	15	16	121	237
1897	5,257	14.5	1,011	23	96	6	.....	6	27	11	28	132	240
1898	5,187	14.7	984	27	122	5	.....	3	30	9	43	59	307
1899	5,332	14.0	994	37	139	4	.....	19	2	10	44	54	270
1900	5,430	14.2	1,083	36	152	5	.....	23	48	25	24	74	393
1901	5,611	14.0	1,155	31	97	3	4	35	83	22	36	93	229
1902	4,981	13.0	937	30	99	5	9	28	25	14	24	46	167
1903	5,305	13.4	927	26	112	3	2	22	14	18	18	57	204
1904	5,728	14.5	1,056	27	128	.....	1	29	3	15	32	65	131
1905	5,996	15.0	1,266	31	109	3	.....	11	67	11	68	42	258
1906	6,161	15.1	1,251	31	115	6	.....	12	19	22	36	67	209
1907	6,302	15.2	1,254	17	108	6	.....	12	12	15	31	67	224

MORTALITY IN THE SANITARY DISTRICTS 1885-1907 — ADIRONDACK AND NORTHERN DISTRICT — (Concluded).

YEAR.	OTHER CAUSES OF DEATH.										
	Consumption.	Acute respiratory diseases.	Puerperal.	Digestive.	Urinary.	Circulatory.	Nervous.	Cancer.	Violence.	Old age.	Unclassified.
1885	359	268	38	149	84	209	253	66	89	217	269
1886	342	220	51	177	93	193	262	92	92	323	212
1887	366	236	32	169	79	182	253	112	106	626	268
1888	381	371	48	226	78	221	317	94	102	743	290
1889	381	330	32	216	117	237	364	110	114	484	289
1890	415	554	38	298	130	287	370	115	132	454	370
1891	460	478	37	323	171	388	433	128	177	556	388
1892	482	603	38	356	174	439	518	133	178	567	458
1893	459	561	44	340	197	402	508	157	163	523	430
1894	510	504	47	326	225	435	514	145	165	501	472
1895	488	459	55	323	195	445	532	173	179	480	437
1896	520	453	35	338	248	472	561	192	215	432	426
1897	571	672	50	377	321	594	627	213	241	539	483
1898	581	551	55	436	304	567	678	212	239	502	462
1899	525	693	39	404	319	552	669	212	207	586	549
1900	539	616	46	399	318	573	678	234	231	470	546
1901	564	703	45	441	322	627	708	208	249	483	628
1902	521	459	42	399	311	591	681	229	262	469	570
1903	493	515	46	446	342	676	685	239	270	480	637
1904	552	545	55	415	351	790	754	255	289	452	839
1905	583	614	65	500	376	717	682	288	314	486	771
1906	550	689	56	466	380	791	782	278	346	409	897
1907	549	790	70	476	494	723	814	272	340	239	1,043

MORTALITY IN THE SANITARY DISTRICTS 1885–1907 — SOUTHERN TIER DISTRICT.

YEAR.	All deaths.	Death rate.	Deaths under five years of age.	EPIDEMIC DISEASES.									
				Cerebro-spinal menin-gitis.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysip-elas.	Whoop-ing-cough.	Diph-theria.	Diar-rhea.
1885	1,741	.....	404	10	41	21	.....	20	18	14	14	48	97
1886	1,852	.....	442	10	49	25	.....	10	5	13	10	76	111
1887	2,513	.....	580	19	76	33	.....	24	6	11	8	111	178
1888	3,276	.....	700	23	93	42	.....	34	32	9	13	112	177
1889	3,390	.....	684	20	115	24	1	34	10	7	22	117	196
1890	3,854	.....	786	23	91	22	.....	30	35	8	58	136	207
1891	4,648	.....	839	22	132	10	1	34	32	7	12	195	248
1892	4,934	.....	880	24	107	7	.....	46	14	13	25	248	207
1893	4,838	.....	940	28	105	8	.....	68	51	17	19	294	241
1894	4,862	.....	993	27	126	12	2	32	6	15	55	192	281
1895	4,780	12.0	930	15	118	13	.....	7	13	18	33	99	242
1896	4,754	13.0	678	18	152	9	.....	11	14	12	10	74	239
1897	5,523	14.0	811	8	75	11	.....	13	27	16	51	91	204
1898	5,462	14.0	891	16	112	18	.....	15	36	11	35	72	327
1899	5,930	14.0	860	30	121	3	.....	28	11	6	39	75	225
1900	5,918	14.0	1,003	21	141	10	.....	28	34	14	42	115	323
1901	5,982	14.0	951	21	107	8	.....	19	33	19	67	80	170
1902	5,811	14.0	987	19	101	6	6	30	29	23	20	121	198
1903	5,966	13.9	943	17	111	5	.....	29	13	14	60	75	178
1904	6,792	15.5	1,032	19	93	7	1	59	58	22	21	103	152
1905	6,425	14.5	1,003	27	77	3	.....	18	9	29	36	71	184
1906	6,443	14.7	1,137	25	124	7	.....	9	4	16	52	61	241
1907	6,909	15.6	1,101	22	90	9	.....	22	28	13	23	88	174

YEAR.	OTHER CAUSES OF *DEATH.*										
	Consumption.	Acute respiratory diseases.	Puerperal.	Digestive.	Urinary.	Circulatory.	Nervous.	Cancer.	Violence.	Old age.	Unclassified.
1885	456	366	41	185	111	263	452	99	115	293	268
1886	471	359	30	286	146	266	426	115	143	460	300
1887	485	364	33	274	156	319	474	165	173	712	367
1888	530	469	43	265	167	330	473	166	212	768	385
1889	527	477	30	303	189	436	549	180	187	631	412
1890	582	693	41	403	228	414	694	154	209	691	400
1891	646	813	44	445	297	524	771	194	230	694	438
1892	661	909	50	443	294	575	850	209	257	699	458
1893	564	702	40	403	323	523	728	200	237	527	465
1894	602	596	34	430	303	462	729	176	254	500	525
1895	608	607	45	389	360	529	715	207	228	536	557
1896	596	655	42	422	340	551	720	189	273	502	574
1897	533	759	62	432	359	570	789	243	277	541	503
1898	606	591	43	427	408	617	828	264	305	482	541
1899	549	807	45	468	431	691	802	255	284	555	824
1900	559	713	46	479	386	625	798	295	331	453	620
1901	608	887	48	512	438	677	828	267	340	473	689
1902	517	631	38	506	426	703	859	282	401	440	668
1903	570	673	49	497	488	775	911	276	371	408	773
1904	579	756	58	550	467	817	878	314	433	481	866
1905	588	778	47	511	488	844	826	331	396	496	846
1906	523	856	62	598	569	893	924	310	441	399	952
1907	604	987	60	558	721	861	975	352	469	211	1,138

MORTALITY IN THE SANITARY DISTRICTS 1885–1907 — EAST CENTRAL DISTRICT.

YEAR.	All deaths.	Death rate.	Deaths under five years of age.	EPIDEMIC DISEASES.								
				Cerebro-spinal menin-gitis.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysip-elas.	Whoop-ing cough.	Diph-theria.	Diar-rhea.
1885	2,444	.....	537	26	48	21	1	10	14	11	8	80	146
1886	2,947	.....	610	20	81	19	1	8	5	26	8	119	151
1887	3,465	.....	765	12	71	40	.....	17	17	12	28	106	196
1888	4,222	.....	949	22	121	37	1	39	53	13	16	182	307
1889	4,290	.....	921	23	103	39	15	52	16	11	21	145	346
1890	4,918	.....	973	24	91	25	.....	24	36	4	34	112	281
1891	5,113	.....	1,066	28	135	24	.....	25	19	14	17	89	350
1892	5,467	.....	1,054	29	78	25	1	26	14	27	22	172	254
1893	5,493	.....	1,114	21	100	17	.....	26	71	17	34	257	264
1894	5,224	.....	1,060	22	116	10	1	23	1	17	28	160	334
1895	5,422	15.5	1,087	24	107	17	.....	33	4	15	25	71	292
1896	5,371	15.4	1,070	27	96	12	.....	40	17	11	15	111	336
1897	5,758	16.0	1,042	30	70	8	.....	21	62	12	39	126	222
1898	5,745	16.0	1,019	15	123	14	.....	22	35	13	21	91	309
1899	5,687	14.0	788	22	107	5	.....	14	5	13	38	47	195
1900	5,796	14.0	1,028	22	110	10	.....	19	47	22	38	61	395
1901	5,801	14.5	894	21	104	4	2	27	75	14	29	64	181
1902*	5,481	14.0	852	20	72	1	.....	9	10	13	30	44	182
1903	5,781	14.3	878	12	70	1	.....	14	30	10	50	50	160
1904	6,422	16.0	961	30	80	2	.....	38	24	20	10	59	135
1905	6,464	15.5	1,082	48	70	9	.....	57	24	20	17	36	207
1906	6,371	15.4	1,124	23	59	1	.....	26	19	10	56	44	229
1907	6,689	15.9	1,085	16	79	2	.....	20	6	16	9	64	249

MORTALITY IN THE SANITARY DISTRICTS 1885-1907 — EAST CENTRAL DISTRICT — (Concluded).

YEAR.	OTHER CAUSES OF DEATH.										
	Consumption.	Acute respiratory diseases.	Puerperal.	Digestive.	Urinary.	Circulatory.	Nervous.	Cancer.	Violence.	Old age.	Unclassified.
1885	342	286	22	149	86	197	291	89	104	212	301
1886	388	321	46	209	101	251	335	110	139	387	224
1887	410	324	47	193	123	274	376	107	166	730	216
1888	467	391	68	237	138	348	446	152	178	762	254
1889	476	434	69	267	176	377	497	158	150	660	244
1890	533	732	44	344	197	454	503	178	227	575	496
1891	546	612	38	380	275	431	616	172	214	717	412
1892	536	780	42	429	256	558	686	195	248	668	441
1893	537	733	48	418	268	551	662	192	243	587	445
1894	565	555	50	406	278	503	649	233	244	539	490
1895	534	655	31	416	316	593	682	255	294	537	552
1896	502	579	40	428	309	640	690	258	266	503	495
1897	557	708	51	464	345	738	757	268	280	538	468
1898	519	615	36	461	361	707	761	305	310	536	491
1899	485	744	41	464	352	719	763	310	275	581	507
1900	513	583	34	470	378	720	760	329	276	474	535
1901	563	649	49	457	360	798	765	295	261	528	555
1902	482	514	51	478	415	786	783	306	287	441	560
1903	479	626	45	458	414	885	773	314	322	468	600
1904	567	734	38	482	459	900	843	325	345	535	796
1905	576	664	42	471	488	970	863	335	352	499	716
1906	491	656	34	464	489	938	831	343	388	438	832
1907	526	797	49	477	596	887	839	337	426	200	894

MORTALITY IN THE SANITARY DISTRICTS 1885–1907 — WEST CENTRAL DISTRICT.

YEAR.	All deaths.	Death rate.	Deaths under five years of age.	EPIDEMIC DISEASES.									
				Cerebro-spinal menin-gitis.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysip-elas.	Whoop-ing. cough.	Diph-theria.	Diar-rhea.
1885	1,812	.....	306	15	45	24	.....	3	3	12	7	41	90
1886	2,056	.....	383	14	42	22	.....	5	1	6	15	42	112
1887	2,474	.....	457	8	47	24	.....	.....	4	12	11	76	144
1888	2,950	.....	412	24	51	20	2	27	11	8	2	69	112
1889	2,918	.....	459	14	58	24	4	23	4	7	11	79	136
1890	3,660	.....	602	15	64	17	1	24	55	9	28	60	163
1891	4,040	.....	519	18	72	11	2	30	10	11	15	36	153
1892	4,349	.....	556	20	61	18	.....	23	8	19	22	84	124
1893	3,865	.....	600	12	61	14	.....	32	14	12	19	167	146
1894	3,868	.....	562	17	65	16	1	23	3	12	12	62	158
1895	4,019	13.4	573	13	82	13	.....	8	5	14	18	56	179
1896	4,086	13.0	638	9	54	20	.....	21	20	11	20	39	217
1897	4,351	14.5	560	21	45	14	.....	9	14	14	18	59	137
1898	4,243	14.3	610	9	39	11	.....	7	10	7	23	24	219
1899	4,565	14.0	568	25	50	8	.....	21	9	9	7	60	159
1900	4,461	14.0	654	13	91	5	.....	15	24	6	27	70	253
1901	4,577	14.3	624	10	60	6	.....	10	29	12	46	28	128
1902	4,448	14.0	593	12	50	8	6	5	3	15	23	33	156
1903	4,822	15.0	608	6	116	5	.....	6	15	20	16	40	128
1904	4,970	15.5	620	13	65	6	.....	7	13	22	7	48	130
1905	5,073	16.0	712	18	57	4	.....	9	22	12	28	37	175
1906	4,917	15.6	722	18	62	4	.....	9	13	7	23	27	179
1907	5,209	16.6	691	20	45	3	.....	15	12	20	27	47	118

MORTALITY IN THE SANITARY DISTRICTS 1885-1907 — WEST CENTRAL DISTRICT — (*Concluded*).

YEAR.	OTHER CAUSES OF DEATH.										
	Consumption.	Acute respiratory diseases.	Puerperal.	Digestive.	Urinary.	Circulatory.	Nervous.	Cancer.	Violence.	Old age.	Unclassified.
1885	281	196	22	138	85	167	275	58	80	218	152
1886	290	178	24	115	94	151	295	72	93	306	179
1887	285	192	23	149	94	162	256	94	101	594	198
1888	330	234	28	185	102	223	339	87	118	749	229
1889	322	293	18	200	137	255	366	104	146	510	227
1890	391	466	21	291	200	361	440	144	153	509	250
1891	428	443	32	312	204	430	529	169	184	639	322
1892	441	599	40	333	197	499	612	171	193	564	287
1893	409	418	35	309	203	386	511	156	187	457	317
1894	459	370	25	313	336	466	537	153	166	448	326
1895	398	468	27	350	255	461	520	162	160	493	337
1896	375	379	30	337	268	510	642	177	182	430	345
1897	392	507	48	359	289	563	677	199	234	441	311
1898	384	421	33	373	322	530	635	218	216	421	341
1899	395	567	23	355	246	635	697	213	211	486	389
1900	375	418	28	346	285	594	658	232	224	415	382
1901	363	526	32	364	305	625	711	227	235	416	444
1902	341	430	30	351	288	710	678	246	251	399	413
1903	355	491	30	379	300	727	732	276	293	420	467
1904	357	513	33	378	352	758	757	250	296	438	527
1905	352	477	30	419	362	726	760	291	294	466	534
1906	315	494	38	399	318	752	729	276	313	357	584
1907	357	584	43	403	452	697	821	288	330	208	719

Mortality in the Sanitary Districts 1885-1907 — Lake Ontario and Western District

Year.	All deaths.	Death rate	Deaths under five years of age.	Cerebro spinal menin gitis	Typhoid fever	Malarial diseases	Epidemic Diseases: Small pox	Scarlet fever	Measles	Erysipelas	Whoop ing cough	Diph theria	Other class
1885	4,745		1,258	24	90	31		24	41	41	43	114	[illegible]
1886	7,448		2,029	70	144	64		74	8	40	41	114	[illegible]
1887	9,065		3,370	65	175	70		124	100	54	55	116	[illegible]
1888	10,530		3,887	72	244	86	46	123	60	54	60	116	[illegible]
1889	9,726		3,397	81	208	61	9	68	10	44	130	116	[illegible]
1890	11,120		3,890	107	250	80		64	100	50	44	116	[illegible]
1891	12,988		4,270	91	306	67		126	70	55	54	116	[illegible]
1892	11,820		4,331	71	260	55		171	15	38	113	116	[illegible]
1893	12,649		4,242	60	267	27		348	48	49	49	116	[illegible]
1894	11,721		3,941	50	205	16	2	115	56	44	1	116	[illegible]
1895	11,519	15 5	3,534	47	227	24		68	151	56	2	116	[illegible]
1896	11,193	15 0	3,367	40	188	19		43	51	52	80	116	[illegible]
1897	11,368	15 3	3,021	51	187	15		44	80	54	110	116	[illegible]
1898	11,446	15 4	2,842	92	224	18		27	7	16	97	116	[illegible]
1899	11,081	13 7	2,807	58	201	9	1	50	73	43	80	97	[illegible]
1900	12,278	14 0	3,240	48	205	7	1	60	116	54	103	116	[illegible]
1901	12,875	15 0	2,983	81	280	4	3	57	65	54	53	116	[illegible]
1902	12,202	14 0	2,930	80	252	5	35	48	80	54	97	116	[illegible]
1903	13,498	15 0	3,120	60	280	3	39	82	77	54	108	116	[illegible]
1904	13,021	15 5	3,171	73	229	9	2	71	46	43	80	116	[illegible]
1905	14,254	15 2	3,844	101	239	5		66	191	55	127	116	[illegible]
1906	14,649	15 5	3,614	124	247	6		54	64	32	60	116	[illegible]
1907	15,627	16 0	4,072	61	265	3	1	65	108	51	122	116	[illegible]

MORTALITY IN THE SANITARY DISTRICTS 1885–1907 —LAKE ONTARIO AND WESTERN DISTRICT—(*Concluded*).

YEAR.	OTHER CAUSES OF DEATH.										
	Consumption.	Acute respiratory diseases.	Puerperal.	Digestive.	Urinary.	Circulatory.	Nervous.	Cancer.	Violence.	Old age.	Unclassified.
1885	617	460	73	280	189	337	658	177	198	390	555
1886	937	707	55	441	226	488	1,047	204	304	579	1,005
1887	950	750	52	540	267	479	1,249	259	389	975	1,017
1888	1,091	1,033	116	687	320	666	1,397	275	528	848	1,283
1889	1,016	1,029	107	670	341	688	1,285	307	503	778	1,336
1890	1,180	1,623	80	889	389	696	1,417	313	564	653	1,419
1891	1,347	1,989	119	1,000	560	868	1,598	392	596	816	1,634
1892	1,281	1,839	91	986	505	905	1,618	333	630	824	1,449
1893	1,179	1,510	121	1,017	542	982	1,688	393	649	823	1,265
1894	1,204	1,324	90	769	521	959	1,565	425	595	785	1,144
1895	1,209	1,552	113	758	583	1,014	1,487	414	547	788	1,001
1896	1,133	1,355	105	742	680	1,078	1,465	459	569	762	893
1897	1,075	1,482	122	792	693	1,116	1,509	495	615	835	882
1898	1,038	1,394	103	814	749	1,173	1,549	530	634	830	1,017
1899	1,114	1,623	93	837	773	1,231	1,553	548	600	870	1,198
1900	1,129	1,408	111	841	824	1,274	1,588	569	663	859	1,186
1901	1,155	1,579	116	967	765	1,337	1,618	665	820	814	1,400
1902	1,030	1,301	101	913	805	1,412	1,670	624	807	787	1,315
1903	1,078	1,454	126	1,046	873	1,595	1,797	678	893	809	1,472
1904	1,175	1,596	118	1,041	842	1,681	1,756	713	839	853	1,747
1905	1,152	1,475	180	954	974	1,720	1,672	768	943	871	1,848
1906	1,086	1,611	182	1,067	1,027	1,800	1,695	763	1,087	692	1,928
1907	1,145	1,923	200	1,259	1,149	1,759	1,744	717	1,113	561	2,482

Mortality from Pulmonary Tuberculosis

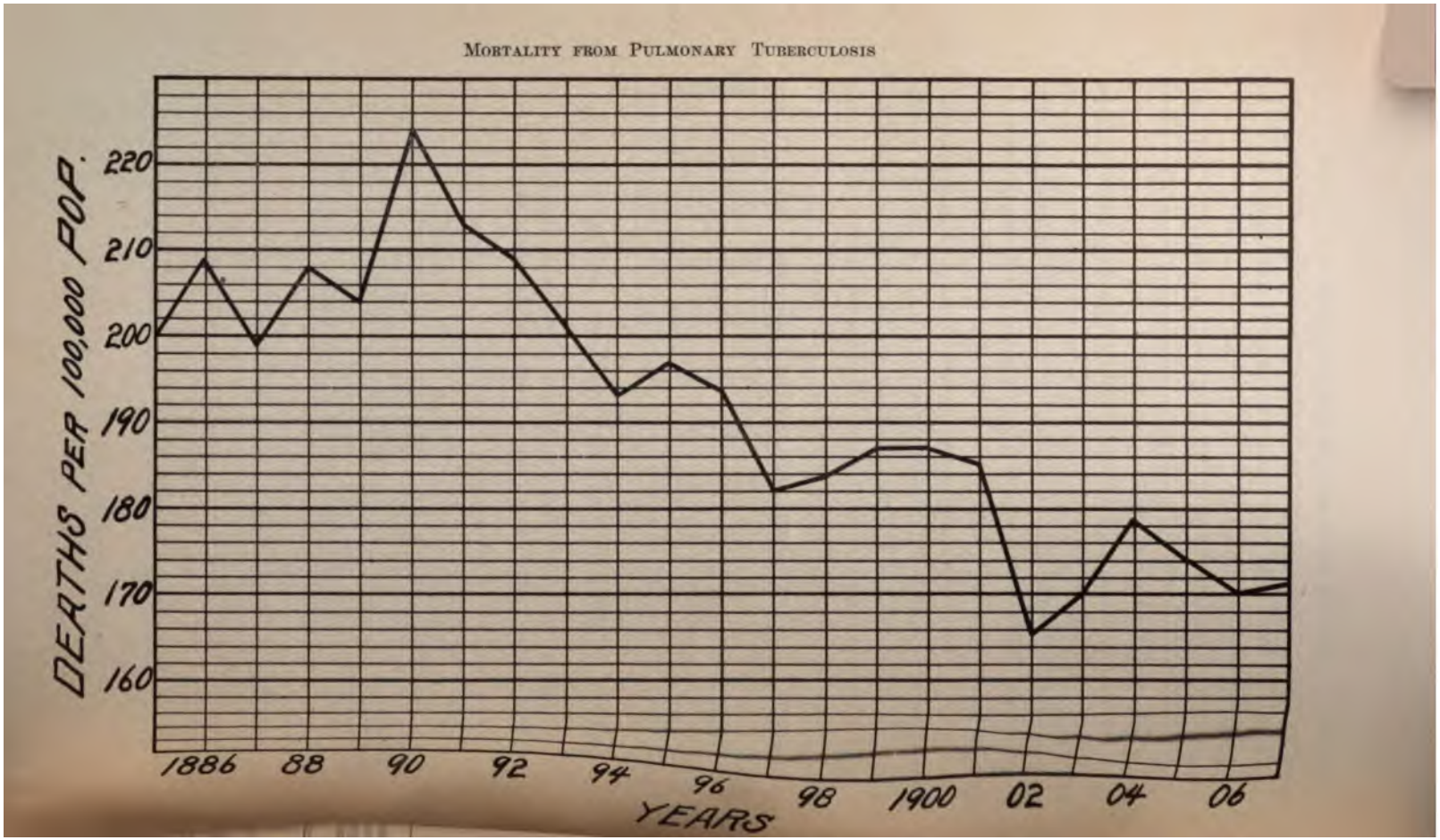
The following table shows the total deaths in the State, death rate per 1,000 population; reported mortality from t losis, and deaths per 100,000 population, due to tuberculos 1885; also percentage of deaths due to tuberculosis.

YEAR.	Population.	Total deaths.	Death rate.	Deaths from tuber-culosis..	Deaths per 100,000 popula-tion.	P of d b
1885	5,609,910	80,407	14.3	11,238	200.3	
1886	5,719,855	86,801	15.2	11,947	208.8	
1887	5,831,947	108,269	18.6	11,609	199.0	
1888	5,946,246	114,584	19.3	12,383	208.2	
1889	6,062,764	113,155	18.6	12,390	204.3	
1890	6,182,600	128,648	20.8	13,831	223.7	
1891	6,316,333	129,850	20.5	13,445	212.8	
1892	6,438,283	131,388	20.3	13,471	209.2	
1893	6,537,716	129,659	19.7	13,123	200.7	
1894	6,638,696	123,423	18.6	12,824	193.1	
1895	6,741,246	128,834	19.1	13,267	196.7	
1896	6,845,375	126,253	18.4	13,265	193.7	
1897	6,951,111	118,525	17.1	12,641	181.8	
1898	7,058,459	122,584	17.4	12,978	183.8	
1899	7,167,491	121,831	17.0	13,412	187.1	
1900	7,281,533	132,352	18.2	13,590	186.6	
1901	7,434,896	131,461	17.7	13,766	185.1	
1902	7,591,491	124,657	16.4	12,582	165.7	
1903	7,751,375	127,602	16.4	13,194	170.2	
1904	7,914,636	142,014	17.8	14,159	178.8	
1905	8,081,333	137,222	17.0	14,064	174.0	
1906	8,251,538	140,773	17.1	14,026	170.0	
1907	8,425,333	147,890	17.5	14,431	171.0	

Reported Mortality from Pulmonary Tuberculosis in the S Districts for past 10 years

DISTRICTS.	1898.	1899.	1900.	1901.	1902.	1903.	1904.	1905.	19
Maritime	8,191	8,546	8,650	8,730	8,080	8,582	9,124	9,096	9,
Hudson Valley	1,258	1,313	1,373	1,342	1,180	1,259	1,346	1,286	1,
Adirondack and Northern	581	525	539	564	521	493	552	583	
Mohawk Valley	606	549	559	608	517	570	579	588	
Southern Tier	401	485	452	441	431	378	459	431	
East Central	519	485	513	563	482	479	567	576	
West Central	384	395	375	363	341	355	357	352	
Lake Ontario and Western	1,038	1,114	1,129	1,155	1,030	1,078	1,175	1,152	1,
Entire State	12,978	13,412	13,590	13,766	12,582	13,194	14,159	14,064	14,

* Includes 25 delayed returns not class ified by district in which they occurred.


Mortality from Pulmonary Tuberculosis
DEATHS PER 100,000 POP.
220
210
200
190
180
170
160
1886
88
90
92
94
96
98
1900
02
04
06
YEARS

Deaths per 100,000 *population from Pulmonary Tuberculosis in the —*

DISTRICTS.	1898.	1899.	1900.	1901.	1902.	1903.	1904.	1905.	1906.	1907.
Maritime	230.6	234.0	230.4	224.9	201.5	207.4	213.8	207.0	210.8	204.6
Hudson Valley	182.8	190.5	198.9	193.7	169.6	180.2	189.1	182.6	159.7	173.8
Adirondack and Northern	148.3	134.0	136.5	141.9	130.2	122.4	136.1	142.8	134.0	132.9
Mohawk Valley	151.1	135.5	136.6	146.1	122.1	132.4	132.3	132.2	115.7	131.1
Southern Tier	94.7	113.8	105.5	102.4	99.6	86.9	105.0	93.1	89.0	90.3
East Central	130.5	121.4	127.9	139.4	118.6	117.1	137.7	139.0	118.1	125.5
West Central	121.6	124.7	118.6	114.9	107.9	121.4	113.1	111.5	99.1	113.6
Lake Ontario and Western	122.6	129.3	128.8	129.6	113.8	117.2	125.8	121.5	113.3	117.1
Entire State	183.3	187.0	187.0	185.3	165.8	170.0	179.0	174.3	170.4	171.0

In each 1,000 *Deaths there were from Tuberculosis in the —*

DISTRICTS.	1898.	1899.	1900.	1901.	1902.	1903.	1904.	1905.	1906.	1907.
Maritime	115	135	114	115	110	117	110	113	115	111
Hudson Valley	115	110	110	113	107	100	108	104	93	95
Adirondack and Northern	112	99	100	110	105	92	96	97	89	87
Mohawk Valley	106	91	90	93	85	90	85	87	73	79
Southern Tier	75	83	76	75	75	65	69	67	61	57
East Central	90	85	90	96	90	80	87	90	77	78
West Central	90	87	84	80	77	75	71	70	64	68
Lake Ontario and Western	100	93	92	90	85	80	85	82	74	73
Entire State	107	110	116	106	102	104	100	103	100	93

The foregoing chart and table are of especial interest at a time when public attention is being aroused to the necessity of taking active steps to stamp out tuberculosis. They show that while the mortality from tuberculosis exceeds that from any other cause, the number of deaths per 100,000 has diminished considerably, and on the whole, regularly. Thus we are given every hope to believe that the campaign of education now being conducted, and the active measures for the prevention of the disease now being instituted will meet with encouraging results and show a more rapid decline in the mortality.

In seventeen years (1890–1907 inclusive) the deaths from tuberculosis have dropped from 224 per 100,000 to 171 per 100,000, a decrease of 53 per 100,000 or 23.7 per cent.

It will be seen also that there has been a slight decline in the percentage of all deaths that is due to tuberculosis. In 1907 this percentage dropped below ten for the first time.

City Mortality from Tuberculosis

The cities showing the largest mortality from tuberculosis per 100,000 population, during the years 1901–1905, are:

Ogdensburg 331.7; Troy, 276.5; Newburgh, 261.4; Albany, 228.0; Cohoes, 220.8; Greater New York, 215.8; Kingston, 209.0.

During 1906 and 1907 there was a decided decrease in the mortality from tuberculosis per 100,000 in all of the above cities excepting Troy, Cohoes, and New York. In Cohoes, the rate increased to 233.3 in 1906, and to 254.2 in 1907. While the rate dropped to 192.5 in 1906 in Newburgh, in 1907 it increased to 240.7. There was a slight decrease in Greater New York and Troy.

Troy maintains the largest rate for 1907 (275.8), and Gloversville (63.8) and New Rochelle (66.1) the smallest.

The rate has decreased in all of the cities in the State since 1901, excepting Cohoes, Cortland, Dunkirk, Geneva, Little Falls, and Watertown, which show a decided increase.

Hudson dropped to 133 in 1906 and increased to 200 in 1907.

Grouped in order of population, the following shows the number of deaths from pulmonary tuberculosis per 100,000 population, during 1907:

Cities with population from 100,000 to 200,000.....	137.4
Cities between 50,000 and 100,000 population.....	179.5
Cities between 20,000 and 50,000 population.....	129.5
Cities between 15,000 and 20,000 population.....	114.2
Cities between 10,000 and 15,000 population.....	116.6
Cities below 10,000 population.....	105.5

The average city rate for the five year period was 203.5, and the rural rate 122.8.

The city rate dropped to 194.1 in 1906 and to 190 in 1907, while the rural rate increased from 112.7 to 125.5.

That altitude is a possible factor in considering the mortality from tuberculosis is shown from the fact that in 14 cities in the State over 450 feet altitude above the sea level, the number of deaths per 100,000 population due to tuberculosis was 111.9, and in 14 cities under 450 feet altitude it was 178.1.

MORTALITY FOR PULMONARY TUBERCULOSIS IN THE CITIES OF [illegible]

CITIES.	Population, 1907 (estimated).	1901-1905.			1906.			1907.		
		Total deaths from tuberculosis.	Deaths per 100,000 population from tuberculosis.	Percentage of total deaths from tuberculosis.	Total deaths from tuberculosis.	Deaths per 100,000 population from tuberculosis.	Percentage of total deaths from tuberculosis.	Total deaths from tuberculosis.	Deaths per 100,000 population from tuberculosis.	Percentage of total deaths from tuberculosis.
New York	4,278,636	40,764	215.8	11.6	8,976	216.0	11.8	8,996	210.0	11.3
Buffalo	386,263	2,403	132.0	8.7	496	129.9	7.7	496	128.5	8.1
Cities between 100,000 *to* 200,000 *population:*										
Rochester	189,288	1,203	138.2	9.5	251	135.2	8.8	239	126.5	8.1
Syracuse	121,153	770	135.2	9.4	138	116.2	7.5	148	122.3	7.7
Albany	100,000	1,110	228.0	12.6	203	206.1	11.5	177	177.0	9.8
Cities between 50,000 *and* 100,000 *population:*										
Troy	77,650	1,053	276.5	13.6	207	270.6	13.4	214	275.8	13.2
Schenectady	69,069	338	141.7	9.3	72	116.3	7.9	81	117.4	7.9
Yonkers	67,230	529	188.2	11.6	103	160.9	9.4	85	126.9	8.0
Utica	65,550	527	174.7	9.6	85	130.8	6.9	122	186.3	9.7
Cities between 20,000 *and* 50,000 *population:*										
Binghamton	43,787	285	139.0	8.1	53	121.3	8.1	44	100.5	6.5
Elmira	35,734	235	134.0	8.7	47	131.7	9.1	46	128.9	8.2
Auburn	32,963	222	143.3	9.1	52	158.1	9.5	41	124.6	7.7
Niagara Falls	29,400	118	99.8	6.2	20	71.9	4.6	26	89.7	4.9
Jamestown	27,466	134	93.0	9.0	22	82.7	8.0	19	70.4	6.1
Newburgh	27,120	286	261.4	11.9	51	192.5	9.7	65	240.7	12.3
Watertown	26,947	114	95.6	6.4	23	88.8	5.0	34	126.4	6.7
Mount Vernon	26,516	135	115.1	8.1	26	101.6	6.5	30	113.2	7.5
Kingston	25,964	242	209.0	11.0	47	184.3	9.9	48	185.3	10.0
Poughkeepsie	25,919	199	174.2	8.8	34	136.0	7.7	29	112.0	5.5
Amsterdam	25,147	170	149.5	9.5	31	129.2	7.4	26	104.0	6.2
Cohoes	24,291	265	220.8	11.3	56	233.3	11.9	61	254.2	12.0
New Rochelle	22,784	86	94.9	7.0	25	116.3	7.3	15	66.1	4.4
Oswego	22,720	167	150.0	9.4	39	177.3	10.3	27	118.9	7.5

MORTALITY FOR PULMONARY TUBERCULOSIS IN THE CITIES OF THE STATE — (*Concluded*).

CITIES.	Population, 1907 (estimated).	1901–1905.			1906.			1907.		
		Total deaths from tuberculosis.	Deaths per 100,000 population from tuberculosis.	Percentage of total deaths from tuberculosis.	Total deaths from tuberculosis.	Deaths per 100,000 population from tuberculosis.	Percentage of total deaths from tuberculosis.	Total deaths from tuberculosis.	Deaths per 100,000 population from tuberculosis.	Percentage of total deaths from tuberculosis.
Cities between 15,000 *and* 20,000 *population:*										
Gloversville	18,800	100	107.9	7.8	20	107.5	7.2	12	63.8	3.9
Rome	17,726	138	171.7	10.0	13	73.4	4.3	33	186.4	9.7
Lockport	17,940	116	135.8	8.7	16	91.4	6.6	22	122.9	8.0
Dunkirk	16,702	56	81.4	5.1	16	100.6	6.3	20	119.8	7.5
Middletown	15,914	147	202.5	10.0	17	106.9	7.1	25	157.2	10.4
Ithaca	15,205	91	129.7	8.4	10	68.0	4.7	19	126.7	7.7
Cities between 10,000 *and* 15,000 *population:*										
Ogdensburg	14,842	215	331.7	12.5	21	141.9	7.8	20	135.1	7.6
Watervliet	14,710	128	177.6	10.6	25	172.4	10.1	26	176.9	10.2
Corning	14,495	75	119.7	8.2	11	79.1	5.9	10	71.4	3.7
Hornell	13,390	74	116.3	8.0	16	123.1	8.5	13	100.0	7.1
Geneva	12,975	48	83.7	5.9	13	104.0	6.4	16	124.0	8.9
Cortland	12,174	38	73.6	6.0	10	87.0	6.6	11	91.7	7.1
Rensselaer	12,013	70	148.6	8.6	10	93.4	6.2	12	100.0	7.0
Little Falls	11,418	57	105.3	9.2	14	127.3	9.2	17	154.5	9.4
Plattsburg	10,884	81	171.0	11.3	6	60.0	4.6	13	120.4	9.4
Hudson	10,594	92	184.3	9.7	14	133.3	6.9	21	200.0	10.6
North Tonawanda	10,591	45	92.6	7.6	6	60.0	4.3	8	76.2	5.8
Olean	10,443	27	54.9	4.8	7	70.0	5.0	9	90.0	6.5
Cities below 10,000 *population:*										
Port Jervis	9,819	83	173.4	10.0	9	92.8	5.1	11	111.1	6.3
Johnstown	9,845	52	104.9	7.9	13	135.4	10.9	12	122.5	8.1
Fulton	9,103	52	121.3	8.3	1	11.4	.73	7	77.8	6.0
Oneida	8,772	51	126.2	8.9	6	71.4	4.6	11	126.4	8.6
Tonawanda	8,000	44	117.1	8.7	9	113.9	10.8	7	87.5	6.4

Mortality from Tuberculosis — Greater New York

YEAR.	Population.	Total deaths.	Deaths from tuberculosis.	Deaths per 100,000 population.	Percentage of all deaths due to tuberculosis.
1898	3,270,939	66,330	7,718	236	11.63
1899	3,356,829	65,347	8,046	239	12.31
1900	3 446 31	70,870	8,162	237	11.52
1901	3 555 442	70,722	8,141	229	11.51
1902	3 667 828	68,131	7,589	207	11.14
1903	3 783 291	67,808	7,990	211	11.78
1904	3 902,073	72,043	8,516	218	11.82
1905	4 024,099	73,631	8,528	212	11.58
1906	4 149,615	75,962	8,976	216	11.82
1907	4 278 636	79,205	8,996	210	11.36

Mortality from Tuberculosis — Rest of the State

YEAR.	Population.	Total deaths.	Deaths from tuberculosis.	Deaths per 100,000 population.	Percentage of all deaths due to tuberculosis.
1898	3,787,520	56,254	5,260	139	9.35
1899	3,810,662	56,484	5,366	141	9.49
1900	3,835,402	61,482	5,428	142	8.83
1901	3,879,454	60,739	5,625	145	9.26
1902	3,923,663	56,526	4,993	127	8.83
1903	3,968,084	59,794	5,204	131	9.43
1904	4,012,563	69,971	5,643	141	8.06
1905	4,057,234	63,591	5,536	136	8.70
1906	4,101,923	64,811	5,050	123	7.79
1907	4,146,697	68,685	5,435	138	8.00

Mortality from Tuberculosis in the State, by Counties

COUNTY.	Population.	All deaths.	Deaths from tuberculosis.	Rate per 100,000 population.
Albany	173,593	3,215	299	172.2
Allegany	43,897	554	21	47.8
Broome	73,468	1,170	65	88.4
Cattaraugus	66,257	910	49	74.0
Cayuga	64,667	1,102	75	116.0
Chautauqua	100,342	1,388	78	77.7
Chemung	50,481	857	64	126.8
Chenango	36,794	666	34	92.4
Clinton	47,099	550	41	87.0
Columbia	42,623	776	62	145.4
Cortland	30,259	440	23	76.0
Delaware	46,849	671	31	66.1
Dutchess	81,481	1,473	104	127.6
Erie	91,415	7,894	598	121.7
Essex	33,261	353	19	57.1
Franklin	48,712	678	115	236.0
Fulton	42,001	684	42	100.0
Genesee	36,248	518	28	77.2
Greene	30,922	564	57	184.3
Hamilton	4,875	46	4	82.0
Herkimer	55,079	777	50	90.7
Jefferson	81,892	1,282	80	97.7
Lewis	26,199	357	17	64.8
Livingston	36,093	567	30	83.1

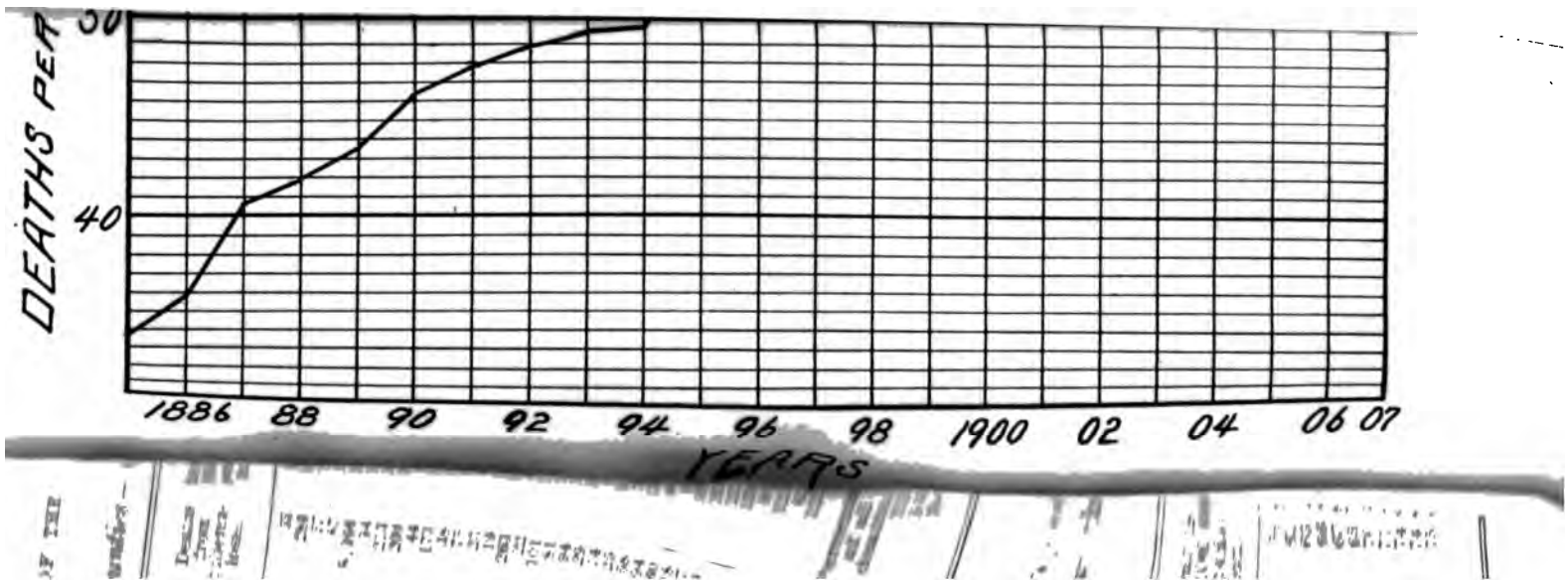
Mortality from Tuberculosis in the State, by Counties — (Con.)

COUNTY.	Population.	All deaths.	Deaths from tuberculosis.	Rate per 100,000 population.
Madison	39,277	601	35	89.1
Monroe	249,024	3,878	289	116.0
Montgomery	51,023	859	57	111.7
Nassau	75,899	1,049	87	114.6
New York	4,278,526	79,205	8,996	201.2
Niagara	89,109	1,409	94	105.5
Oneida	142,080	2,457	213	149.9
Onondaga	182,303	2,841	200	109.8
Ontario	53,762	728	44	81.1
Orange	109,914	1,868	173	157.4
Orleans	31,755	463	38	119.7
Oswego	69,723	1,145	75	107.6
Otsego	47,815	798	23	48.1
Putnam	14,398	243	19	131.9
Rensselaer	122,743	2,362	263	214.3
Rockland	47,799	257	22	46.0
St. Lawrence	90,281	1,352	101	111.8
Saratoga	63,229	1,079	81	128.1
Schenectady	82,660	1,208	94	113.7
Schoharie	24,456	396	29	118.5
Schuyler	14,745	276	14	95.0
Seneca	24,239	411	25	103.1
Steuben	81,201	1,200	58	71.4
Suffolk	82,929	1,236	94	113.3
Sullivan	35,829	638	160	446.6
Tioga	26,391	459	18	68.2
Tompkins	34,145	561	37	108.3
Ulster	85,662	1,478	139	162.2
Warren	32,724	505	45	137.5
Washington	48,135	790	63	130.8
Wayne	48,276	762	44	91.1
Westchester	250,290	4,048	305	121.8
Wyoming	31,598	447	26	82.2
Yates	18,926	304	23	121.5
				Percentage of all deaths.
State prisons	.....	32	10	31.2
Hospitals for insane	.....	1,614	226	14.0
Other public institutions	.....	370	40	10.8

Mortality from Cancer

The reported mortality from cancer and deaths per 100,000 population due to cancer in the State since 1885 is shown by the following:

YEAR.	Deaths from cancer.	Deaths per 100,000 population.	YEAR.	Deaths from cancer.	Deaths per 100,000 population.
1885	1,887	33.6	1897	4,131	59.4
1886	2,050	35.8	1898	4,375	62.0
1887	2,363	40.5	1899	4,535	63.2
1888	2,497	41.9	1900	4,871	66.9
1889	2,638	43.5	1901	5,033	67.6
1890	2,868	46.3	1902	4,989	65.7
1891	3,028	47.9	1903	5,456	70.3
1892	3,152	48.9	1904	5,697	71.9
1893	3,232	49.4	1905	6,055	74.9
1894	3,305	49.7	1906	6,169	74.8
1895	3,554	52.7	1907	6,420	75.9
1896	3,789	55.3			


DEATHS PER
50
40
1886
88
90
92
94
96
98
1900
02
04
06
07
YEARS

S
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188
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The above table and the chart, which conveys the same information in a more graphic measure, reveals a very distressing situation. Beginning with a mortality of 33.6 per 100,000 of population in 1885, the annual mortality has risen steadily, excepting a slight decrease in 1902, until in 1907, a period of twenty-three years, it has attained to 75.9 per 100,000, an increase of 124.5 per cent., or an average annual increase of 5.4 per cent.

Reported mortality from Cancer in the sanitary districts for past 10 *years* —

DISTRICT.	1898.	1899.	1900.	1901.	1902.	1903.	1904.	1905.	1906.	1907.
Maritime	2,174	2,302	2,449	2,651	2,557	2,828	2,967	3,151	3,288	3,514
Hudson Valley	419	415	476	459	497	536	535	549	580	571
Adirondack and Northern	212	212	234	208	220	239	255	288	278	272
Mohawk Valley	264	255	295	267	282	276	314	331	310	352
Southern Tier	253	280	287	261	259	309	338	342	331	349
East Central	305	310	329	295	304	314	325	335	343	337
West Central	218	213	232	227	246	276	250	291	276	283
Lake Ontario and Western	530	548	569	665	624	678	713	768	763	717
Entire State	4,375	4,535	4,871	5,033	4,989	5,456	5,697	6,055	6,169	6,420

Deaths from Cancer per 100,000 *population in the* —

DISTRICT.	1898.	1899.	1900.	1901.	1902.	1903.	1904.	1905.	1906.	1907.
Maritime	58	57	62	66	65	61	71	72	72	75
Hudson Valley	60	56	68	67	72	77	78	78	82	80
Adirondack and Northern	54	54	60	53	58	60	64	75	68	66
Mohawk Valley	67	65	74	65	67	66	73	76	69	76
Southern Tier	60	64	65	63	60	72	78	78	75	80
East Central	74	74	79	74	76	79	80	80	82	80
West Central	70	65	71	71	78	86	80	90	87	91
Lake Ontario and Western	61	61	65	75	71	75	78	81	80	73
Entire State	61.8	63.2	66.0	67.7	65.7	70.0	70.2	75.0	75.0	76.0

In each 1,000 *Deaths there were from Cancer in the* —

DISTRICT.	Decade 1885–1894.	Decade 1895–1904.	1905.	1906.	1907.
Maritime	21.6	31.8	39.4	30.9	40.7
Hudson Valley	25.8	37.6	44.2	48.1	44.1
Adirondack and Northern	32.0	42.0	48.0	45.1	43.1
Mohawk Valley	34.2	42.5	48.8	42.8	46.1
Southern Tier	35.5	46.5	53.5	51.3	50.5
East Central	36.4	51.8	52.0	53.8	50.3
West Central	37.5	49.5	57.2	56.1	55.2
Lake Ontario and Western	30.2	46.5	54.0	52.1	45.8
Entire State	25.0	37.0	44.2	43.9	43.4

Mortality from Typhoid Fever

The following table shows the reported mortality from typhoid fever and deaths per 100,000 population due to typhoid since 1885.

YEAR.	Deaths.	Deaths per 100,000 population.	YEAR.	Deaths.	Deaths per 100,000 population.
1885	1,067	19.0	1897	1,351	19.4
1886	1,169	20.4	1898	1,810	25.6
1887	1,327	22.7	1899	1,604	22.4
1888	1,483	24.9	1900	1,948	26.7
1889	1,550	25.6	1901	1,741	23.4
1890	1,612	26.1	1902	1,318	17.4
1891	1,926	30.5	1903	1,665	21.5
1892	1,664	25.8	1904	1,652	20.9
1893	1,685	25.7	1905	1,554	19.2
1894	1,640	24.7	1906	1,568	19.0
1895	1,716	25.4	1907	1,673	19.8
1896	1,542	22.6			

The low mortality from typhoid fever shown for the earlier years is no doubt owing to incomplete registration of vital statistics.

In 1891 typhoid fever caused nearly 10 per cent. of the entire zymotic mortality.

In December, 1890, and January and February, 1891, a remarkable epidemic prevailed in the cities of Albany, Cohoes, Schenectady, and Watervliet (then West Troy), and to some extent in the surrounding country.

Epidemic prevalence on a minor scale was also reported from other parts of the State.

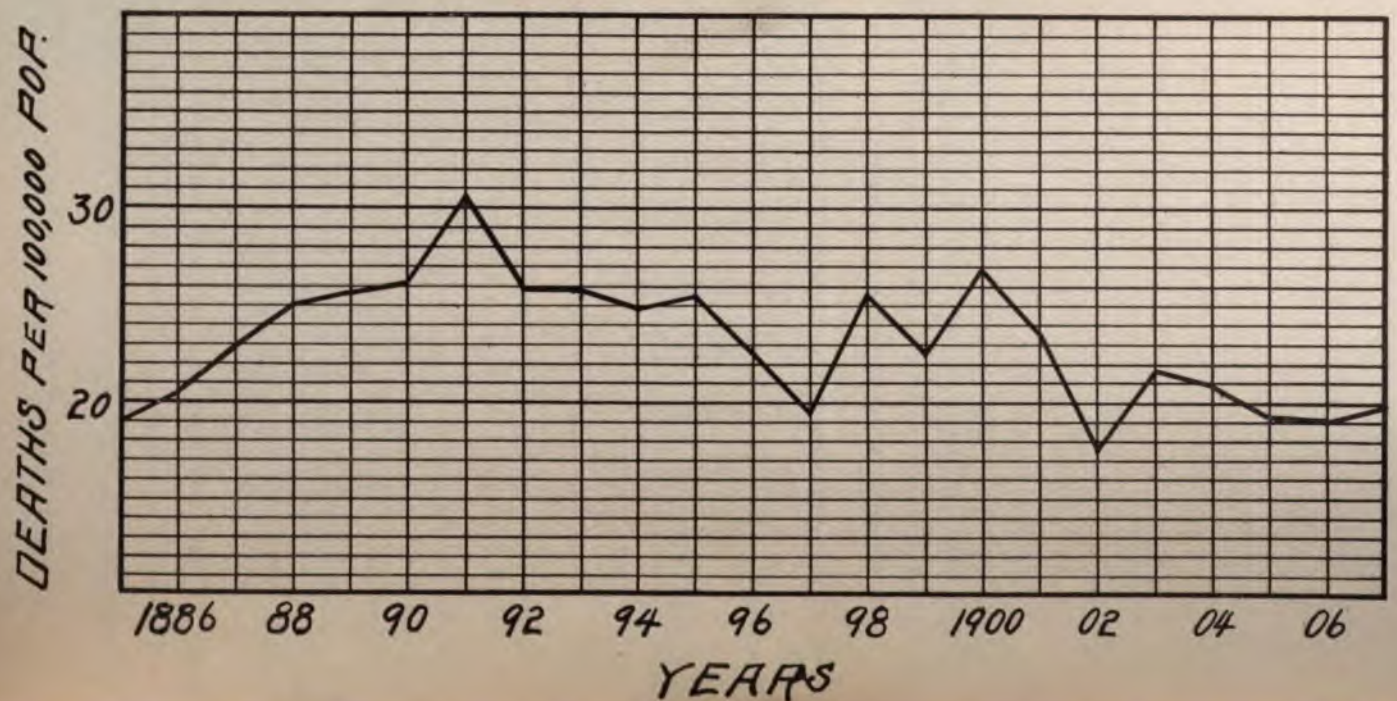
In 1900 the mortality was 26.7 per 100,000 population. This was due to the prevalence of the disease in the Hudson valley, Adirondack and Northern, the Mohawk valley and southern tier districts.

There was a decided decrease in the mortality in 1901 and 1902.

In 1903 two conspicuous epidemics occurred in Ithaca and West Seneca.

The city death rate from typhoid fever in 1907 was 20.1 per 100,000 population, and the rural death rate 19.2.

MORTALITY FROM TYPHOID FEVER.



aths from Typhoid Fever per 100,000 *population in the —*

DISTRICT	1898.	1899.	1900.	1901.	1902.	1903.	1904.	1905.	1906.	1907.
ne	20.3	15.8	20.2	20.0	20.2	16.8	17.0	16.2	15.2	17.2
n Valley	48.2	46.1	50.7	34.3	36.0	25.4	35.1	28.4	26.1	27.3
ack and Northern	31.1	35.3	38.5	24.4	24.7	27.8	31.5	26.7	27.9	25.1
k Valley	32.0	22.2	34.0	26.4	19.8	23.4	19.4	18.4	19.4	17.2
n Tier	26.4	28.4	32.9	24.8	23.3	25.5	21.2	17.5	27.9	20.3
ntral	31.0	26.7	27.4	25.7	17.7	17.1	19.4	16.9	14.1	18.8
ntral	12.3	15.7	28.8	19.0	15.8	36.7	20.5	18.0	19.4	14.3
ntario and Western	26.4	23.3	23.3	28.0	27.8	30.4	24.5	25.2	25.8	21.1
ire State	25.6	22.4	26.8	23.4	17.4	21.5	20.9	19.3	19 1	19.8

each 1,000 *deaths there were from Typhoid Fever in the —*

DISTRICT	1898.	1899.	1900.	1901.	1902.	1903.	1904.	1905.	1906.	1907.
e	10	8	10	10	11	10	9	9	8	9
Valley	28	26	28	20	23	14	20	17	15	15
ack and Northern	23	26	26	17	20	21	22	18	19	17
k Valley	22	13	23	17	14	16	13	12	12	10
n Tier	20	20	24	18	17	20	11	12	19	13
ntral	21	19	20	18	13	14	12	11	9	11
ntral	10	11	20	13	11	24	13	11	13	9
ntario and Western	21	17	17	20	20	21	17	17	16	17
ire State	15	13	17	13	14	14	12	12	11	11

CITY MORTALITY FROM TYPHOID

1 the following table showing the mortality from typhoid r for the past ten years in the cities of New York State, ities are grouped according to the source of their public water ly.

MORTALITY FROM TYPHOID FEVER FOR THE PAST TEN YEARS IN THE CITIES OF NEW YORK STATE.

Showing total deaths from Typhoid Fever, and deaths per 100,000 population.

CITY.	Average rate per 100,000 for 10 years.	1898.		1899.		1900.		1901.		1902.		1903.		1904.	
		Total deaths.	Rate per 100,000.	Total deaths.	Rate per 100,000.	Total deaths.	Rate per 100,000.	Total deaths.	Rate per 100,000.	Total deaths.	Rate per 100,000.	Total deaths.	Rate per 100,000.	Total deaths.	Rate per 100,000.
Cities using unfiltered lake water:															
Auburn	19.1	2	6.8	7	23.4	12	39.5	7	22.9	3	9.7	8	25.8	9	28.8
Buffalo	27.9	98	29.4	88	25.7	90	25.5	98	27.4	123	33.9	133	36.2	91	24.4
Dunkirk	40.0	1	8.9	2	17.5	6	51.6	4	32.4	10	76.5	4	29.0	6	41.3
Geneva	32.1	5	50.7	5	49.2	0	.....	5	46.3	1	9.0	6	52.1	5	42.0
Syracuse	18.9	45	43.1	26	24.4	31	29.1	20	18.1	10	8.9	18	15.8	17	14.7
Cities using unfiltered river water:															
Cohoes	90.0	28	118.5	21	88.3	27	113.0	14	58.4	32	133.2	22	91.3	25	103.6
Lockport	56.8	24	145.7	3	18.1	3	18.0	12	71.5	6	35.4	13	75.7	6	34.6
Niagara Falls	135.0	21	107.9	22	113.0	24	123.3	30	143.7	33	148.1	27	114.0	34	135.3
North Tonawanda	27.8	2	24.3	2	23.1	1	11.0	3	32.3	1	10.5	4	41.1	3	30.2
Ogdensburg	59.1	9	72.4	11	87.8	5	39.5	4	31.4	8	62.3	8	61.7	9	68.9
Oswego	44.9	4	18.1	5	22.6	10	45.0	5	22.4	4	17.5	12	53.5	14	62.3
Rome	23.3	5	32.7	4	26.1	1	6.5	2	12.2	4	25.2	3	18.6	4	24.5
Tonawanda	24.6	3	40.7	1	13.5	1	13.4	1	13.3	0	.....	2	26.0	3	38.4
Cities using filtered river water:															
Albany	37.6	94	99.6	82	87.0	38	40.3	20	21.1	29	30.2	19	19.7	18	18.5
Binghamton	27.9	28	72.3	10	25.5	17	42.8	21	52.4	11	27.1	4	9.7	4	9.6
Elmira	42.8	17	48.3	12	33.6	17	47.6	9	25.4	14	39.7	28	80.0	18	51.6
Poughkeepsie	45.2	5	21.1	6	25.1	11	45.7	10	41.1	5	20.3	11	44.2	15	59.7
Rensselaer	73.7	11	148.0	8	107.3	7	93.7	5	61.6	8	91.2	3	31.8	9	89.4
Watertown	77.4	19	93.6	18	85.7	22	101.4	8	35.6	15	64.7	17	71.0	52	211.0
Watervliet	57.5	6	42.2	15	105.7	11	77.0	8	55.6	9	62.3	8	55.2	9	61.8
Cities using well or spring water:															
Corning	42.4	4	37.9	3	27.7	6	54.2	5	43.2	3	24.9	6	48.0	6	46.1
Cortland	32.9	4	44.8	5	55.8	3	33.2	11	116.2	1	10.1	0	.....	1	9.2
Fulton	32.9	3	38.6	2	25.0	0	.....	2	24.0	1	11.8	8	93.2	3	34.8
Ithaca	51.8	1	7.9	1	7.8	6	45.6	6	44.6	1	7.3	50	367.0	4	27.9

Cities using water from streams and reservoirs:															
Amsterdam	33.5	28	140.8	4	19.8	3	14.3	5	23.2	4	18.1	10	44.0	4	17.1
Gloversville	19.3	5	30.4	3	16.7	9	49.0	1	5.4	8	43.3	2	10.8	1	5.4
Johnstown	23.2	6	62.1	2	20.2	7	69.1	0	....	2	20.0	3	30.1	0	....
Newburgh	37.5	4	15.9	12	48.4	11	44.1	6	23.7	12	47.0	9	34.7	11	42.0
New Rochelle	19.1	1	7.4	1	7.1	1	6.8	6	38.0	5	29.3	4	22.0	3	15.5
Plattsburg	27.1	5	61.3	2	24.1	2	23.7	3	34.1	1	11.0	2	21.1	0	....
Rochester	14.9	19	12.1	32	20.0	30	18.4	32	19.2	19	11.2	21	12.1	27	15.2
Troy	52.7	51	70.6	48	65.1	76	101.2	42	55.7	37	48.8	25	32.8	34	44.4
Utica	17.9	14	26.0	9	16.3	8	14.1	9	15.6	12	20.3	10	16.6	11	17.8
Port Jervis	43.7	1	10.7	1	10.6	3	31.9	3	31.8	5	52.5	7	73.1	7	72.6
New York (Greater)	18.2	688	21.2	546	16.3	718	20.8	727	20.4	762	20.8	634	16.8	659	16.9
Cities using filtered surface water:															
Hornell	33.4	7	59.8	9	76.1	3	25.1	4	32.8	4	32.1	7	55.0	1	7.7
Hudson	64.6	7	72.8	6	62.8	9	94.4	4	41.3	8	81.3	3	30.0	17	167.7
Kingston	17.5	1	4.2	7	28.9	2	8.1	3	12.1	4	16.0	5	19.9	3	11.8
Little Falls	35.8	2	19.9	3	29.3	13	125.2	3	28.5	4	37.5	3	27.7	4	36.4
Middletown	24.6	6	42.8	3	21.0	2	13.7	2	13.8	8	55.1	2	13.8	1	6.9
Mount Vernon	14.4	3	15.7	1	5.0	1	4.9	3	13.6	2	8.8	2	8.5	5	20.6
Yonkers	10.3	6	13.4	5	10.8	2	4.1	8	15.9	5	9.3	8	14.2	9	15.2

MORTALITY FROM TYPHOID FEVER FOR THE PAST TEN YEARS — (*Concluded*).

CITY.	1905.		1906.		1907.		SOURCE OF WATER SUPPLY.
	Total deaths.	Rate per 100,000.	Total deaths.	Rate per 100,000.	Total deaths.	Rate per 100,000.	
Cities using unfiltered lake water:							
Auburn	5	15.9	4	12.1	2	6.0	Owasco Lake.
Buffalo	90	24.0	90	23.6	113	29.2	Lake Erie.
Dunkirk	6	39.3	5	31.4	12	71.8	Lake Erie.
Geneva	4	32.7	3	24.0	2	15.4	Seneca Lake.
Syracuse	17	14.5	11	9.2	14	11.6	Skaneateles lake.
Cities using unfiltered river water:							
Cohoes	14	57.9	14	57.8	19	78.2	Mohawk river.
Lockport	9	51.8	12	67.6	9	50.1	Erie canal. New supply being developed from the Niagara river at N. Tonawanda.
Niagara Falls	49	184.4	43	154.5	37	126.0	Niagara river. Water supplied to one part of the town is partly filtered.
North Tonawanda	4	39.3	2	19.3	5	47.2	Niagara river.
Ogdensburg	7	53.1	10	67.3	7	47.1	Oswegatchie river.
Oswego	19	84.1	13	58.0	15	66.0	Oswego river.
Rome	7	42.3	5	28.2	3	17.0	Mohawk river.
Tonawanda	2	25.3	4	50.6	2	25.0	Niagara river.
Cities using filtered river water:							
Albany	19	19.3	20	20.3	20	20.0	Hudson river. Filtered since September, 1899.
Binghamton	5	12.0	4	9.1	8	18.2	Susquehanna river. Filtered since June, 1902.
Elmira	10	28.8	16	44.7	10	28.0	Chemung river and storage reservoir on Hoffman creek; all water is filtered since 1896.
Poughkeepsie	11	43.3	10	39.4	29	112.0	Hudson river. Filtered.
Rensselaer	4	37.3	2	18.6	7	58.3	Hudson river. Filtered since 1902.
Watertown	6	23.6	13	50.0	10	37.1	Black river. Filtered since October, 1904.
Watervliet	7	47.9	7	47.7	3	20.4	Mohawk river. Filtered.
Cities using well or spring water:							
Corning	4	30.0	6	43.1	10	69.0	Springs.
Cortland	3	26.6	1	8.7	3	24.6	Springs.
Fulton	2	22.6	5	56.5	2	22.0	Wells and springs.
Ithaca	2	13.7	1	6.8	0	.....	Six Mile creek. Unfiltered until epidemic in 1903. Since then a filter has been used or water has been taken from deep wells and springs.
Olean	0	.....	2	20.0	2	19.1	Driven wells.
Oneida	0	.....	1	11.8	0	.....	Springs.
Jamestown	6	23.0	9	33.8	5	18.2	Artesian wells.
Schenectady	5	8.6	11	17.8	6	8.7	Large wells. Use of Mohawk river discontinued 1902

Cities using water from streams and reservoirs:							
Amsterdam	4	10.7	0	24.8	4	15.9	Creeks with large reservoirs.
Gloversville	4	21.4	1	5.3	1	5.3	Streams and storage reservoirs.
Johnstown	1	10.2	2	20.4	0	.....	Springs and streams.
Newburgh	10	37.1	11	41.3	11	41.0	Small streams and storage reservoir.
New Rochelle	4	19.5	5	23.2	5	22.0	Surface streams and storage reservoirs. Small quantity from wells at times.
Plattsburg	4	39.2	3	28.7	3	27.6	Surface streams and reservoirs.
Rochester	19	10.5	30	16.2	27	14.3	Hemlock lake and tributaries.
Troy	36	46.8	28	36.2	20	25.8	Small lakes and streams. Partial use of Hudson river discontinued May, 1906.
Utica	6	9.5	18	27.6	10	15.2	Small surface streams.
Port Jervis	7	72.2	3	31.0	5	51.0	Surface ponds and streams.
New York (Greater)	635	15.8	639	15.5	740	17.4	The sources of supply for the different boroughs of Greater New York are as follows: Boroughs of Manhattan and the Bronx obtain their water from streams, lakes, ponds, and reservoirs on the Croton, Bronx and Byram watersheds. Borough of Brooklyn, about 60% of the water is underground water or is filtered through artificial filters; the remainder is surface water from streams and storage reservoirs. Borough of Queens' water supply is underground water from driven wells. Borough of Richmond obtains underground water from wells.
Cities using filtered surface water:							
Hornell	4	30.2	1	7.5	1	7.5	Surface water. Filtered since 1899.
Hudson	5	48.5	4	38.0	1	9.4	Hudson river. Filtered prior to February, 1905. Purer small streams filtered since then.
Kingston	8	31.3	4	15.6	7	27.0	Surface streams and Cooper lake, filtered.
Little Falls	0	.....	5	44.7	1	8.8	Surface water from two different streams. The water from one stream is filtered.
Middletown	6	41.3	3	18.8	3	18.8	Surface water filtered.
Mount Vernon	5	20.0	5	19.4	10	37.7	Surface water filtered.
Yonkers	1	1.6	4	6.2	8	11.9	Surface streams and storage reservoirs unfiltered; tube wells and Sawmill river, which is filtered.

The table below of some of the cities that have made marked changes or improvements in their water supplies, makes comparisons between the average typhoid death rates per hundred thousand people for a period of seven or eight years prior to the improvement and for the period since the changes. The average for Rensselaer is 5 years prior.

The comparisons should show in a general way a reduced typhoid death rate, after an improvement in the water supply.

The reduction is necessarily most marked where the water used previous to the change was exceptionally bad and where the improvement has most effectually and persistently eliminated infected drinking water.

Local conditions will effect the table in individual cases, such as the proportion of the population using the public supply and the source and quality of the water used other than the public supply.

Hospitals are also factors as they treat many imported cases whose deaths are charged to the cities in which the hospital exists.

The milk supply is another factor that differs in quality in different cities; and there are others that will modify the typhoid death rate in specific instances.

If these local conditions existed for the period covered by the average of deaths prior to the improvement in the water supplies as well as afterwards, they would not mask the effect of the improved water supply upon the typhoid death rate for the individual city. But it is obvious that it would not be just to make direct comparisons between the typhoid death rates of two different cities unless the difference in local environments is given weight.

The following table shows the average typhoid death rate per 100,000 for a period prior to the improvement in the water supply; the average typhoid death rate per 100,000 since the change in the water supply and the percentage of reduction caused by the improvement.

PLACE.	Average before improvement.	Average after improvement.	Per cent reduction in death rate.
1. Albany	88.8	23.7	73.0
2. Binghamton	39.3	11.7	72.2
3. Elmira	54.9	41.5	24.4
4. Hornell	42.2	24.7	41.4
5. Hudson	64.3	31.9	50.5
6. Ithaca	67.2	14.6	78.3
7. Rensselaer	95.5	54.4	43.0
8. Schenectady	25.0	14.4	42.6
9. Troy	58.2	31.0	46.8
10. Watertown	94.7	36.9	61.8

The sources and improvements made in the water supplies are as follows:

1. Albany, prior to September, 1899, pumped raw Hudson river water to supply about two-thirds of the water consumed. The remainder came by gravity from the watersheds just west of the city.

Since 1899 all the water taken from the Hudson has been filtered through the slow sand filters installed at that time. About one-third of the city's water still comes from the unfiltered gravity sources.

2. Binghamton's supply comes from the Susquehanna river. Since 1902 the water has been filtered through a gravity mechanical filter of concrete construction.

3. Elmira receives most of its water from the Chemung river and some comes from a gravity storage reservoir on Hoffman creek. Since the epidemic of 1896 all of the public supply has been filtered by mechanical gravity filters.

The first eighteen units were of the Morrison-Jewell high gravity type, consisting of double circular wooden tanks, and having mechanical rakes to assist in agitating the sand while washing.

Lately three more units of the Jewell type have been added. These are quite similar in construction to the older units.

4. Hornell obtains its water supply from a gravity source about five miles north of the city. Since 1899 the water has been filtered through mechanical filters of the horizontal pressure type using aluminum sulphate as a coagulant.

5. Hudson formerly filtered the Hudson river water through slow sand filters.

This was one of the older plants in America and not thoroug modern in design. Since 1905, the raw water has been tal from a purer gravity source and the filter plant rebuilt a modernized.

6. Ithaca prior to the epidemic of 1903 used unfiltered grav water. Since then the water has been filtered through mechs cal gravity filters or it has been obtained from wells and spri giving water of a superior quality.

7. Rensselaer formerly used raw Hudson river water, but sii 1902 the river water has been filtered through mechanical grav filters using aluminum sulphate as a coagulant, and of the Jew type.

8. Schenectady formerly obtained its water from the Moha river; later it was obtained from wells or infiltration galleries a in emergencies the Mohawk river water was still used, but sir 1904 all the water has been obtained from the wells or galleri

9. Troy formerly obtained some of its water supply by pun ing from the Hudson river. The remainder came from the su face gravity supply, but since 1906 the Hudson river has r been used as a source, and all the water is obtained from gravi sources.

10. Watertown formerly used raw Black river water. Sin 1905 the water has been filtered through gravity mechanical filt of concrete construction and using alum sulphate as a coagula

The influence of water supplies upon typhoid fever death ra is shown by the following, compiled by the United States Cens Bureau:

	Mean typhoid fever de rate from 1902 to 19 per 100,000 of populat
Four cities using ground water from large wells..	18.1
Eighteen cities using impounded and conserved rivers or streams.....	18.5
Eight cities using water from small lakes.....	19.3
Seven cities using water from the Great Lakes....	32.8
Five cities using both surface and underground water.....	45.7
Nineteen cities using polluted river water.....	61.1

The rates for cities using unpurified river water fluctuate from 33.1 at Minneapolis, to 122.1 at Allegany, and even 133.1 at Pittsburg.

Mortality from Typhoid fever in the State, by Counties.

COUNTY.	Population.	All deaths.	Deaths from typhoid.	Rate per 100,000 population.
Albany	173,593	3,215	47	27.1
Allegany	43,897	554	3	6.8
Broome	73,468	1,170	12	16.3
Cattaraugus	66,257	910	2	3.0
Cayuga	64,667	1,102	9	13.9
Chautauqua	100,342	1,388	24	23.9
Chemung	50,481	857	13	25.8
Chenango	36,794	666	2	5.4
Clinton	47,099	550	5	10.6
Columbia	42,623	776	5	11.7
Cortland	30,259	440	5	16.5
Delaware	46,849	671	12	25.6
Dutchess	81,481	1,473	35	42.9
Erie	491,415	7,894	132	26.7
Essex	33,261	353	6	18.0
Franklin	48,712	678	8	16.4
Fulton	42,001	684	1	2.3
Genesee	36,248	518	5	13.8
Greene	30,922	564	9	29.1
Hamilton	4,875	46	3	61.5
Herkimer	55,079	777	4	7.2
Jefferson	81,892	1,282	23	25.6
Lewis	26,199	357	1	3.8
Livingston	36,093	567	4	11.1
Madison	39,277	601	2	5.1
Monroe	249,024	3,878	32	12.9
Montgomery	51,023	859	11	21.5
Nassau	75,890	1,049	11	14.5
New York	4,278,526	79,205	740	17.3
Niagara	89,109	1,409	57	63.9
Oneida	142,080	2,457	24	16.9
Onondaga	182,303	2,841	25	13.2
Ontario	53,762	728	7	13.0
Orange	109,914	1,868	33	30.0
Orleans	31,755	463	7	22.0
Oswego	69,723	1,145	24	34.4
Otsego	47,815	798	18	37.6
Putnam	14,398	243	1	6.9
Rensselaer	122,743	2,362	38	31.0
Rockland	47,790	257	2	4.2
St. Lawrence	90,281	1,352	27	29.9
Saratoga	63,229	1,079	16	25.3
Schenectady	82,660	1,208	8	9.7
Schoharie	24,456	396	9	36.8
Schuyler	14,745	276	3	20.3
Seneca	24,239	411	8	33.0
Steuben	81,201	1,200	16	19.7
Suffolk	82,929	1,236	9	10.9
Sullivan	35,829	638	11	30.6
Tioga	26,391	459	11	41.6
Tompkins	34,145	561	1	2.9
Ulster	85,662	1,478	16	18.7
Warren	32,724	505	12	36.6
Washington	48,135	790	12	24.9
Wayne	48,276	762	9	18.6
Westchester	250,290	4,048	47	18.7
Wyoming	31,598	447	2	6.3
Yates	18,926	304	1	5.2

Mortality from Diphtheria.

The reported mortality from Diphtheria and deaths p 100,000 population is shown by the following:

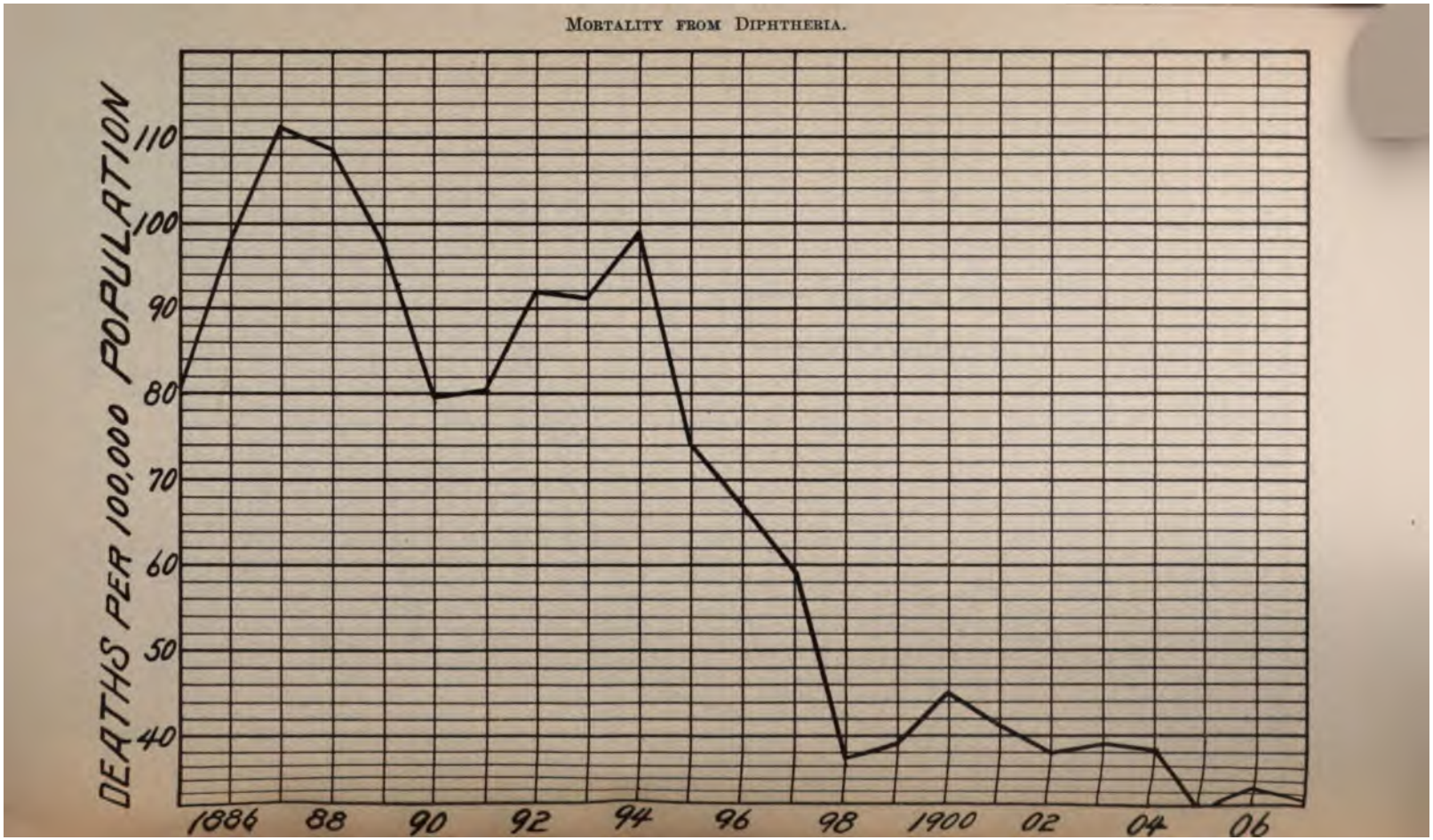
YEAR.	Deaths from diphtheria.	Deaths per 100,000 population due to diphtheria.	YEAR	Deaths from diphtheria.	Deat per 100 popula due t diphth
1885	4,508	80.3	1897	4,115	
1886	5,597	97.8	1898	2,612	
1887	6,490	111.3	1899	2,786	
1888	6,448	108.4	1900	3,306	
1889	5,885	96.9	1901	3,026	
1890	4,915	79.5	1902	2,859	
1891	5,072	80.3	1903	3,035	
1892	5,918	91.9	1904	3,041	
1893	5,947	91.0	1905	2,296	
1894	6,592	99.3	1906	2,691	
1895	4,989	74.0	1907	2,603	
1896	4,597	67.1			

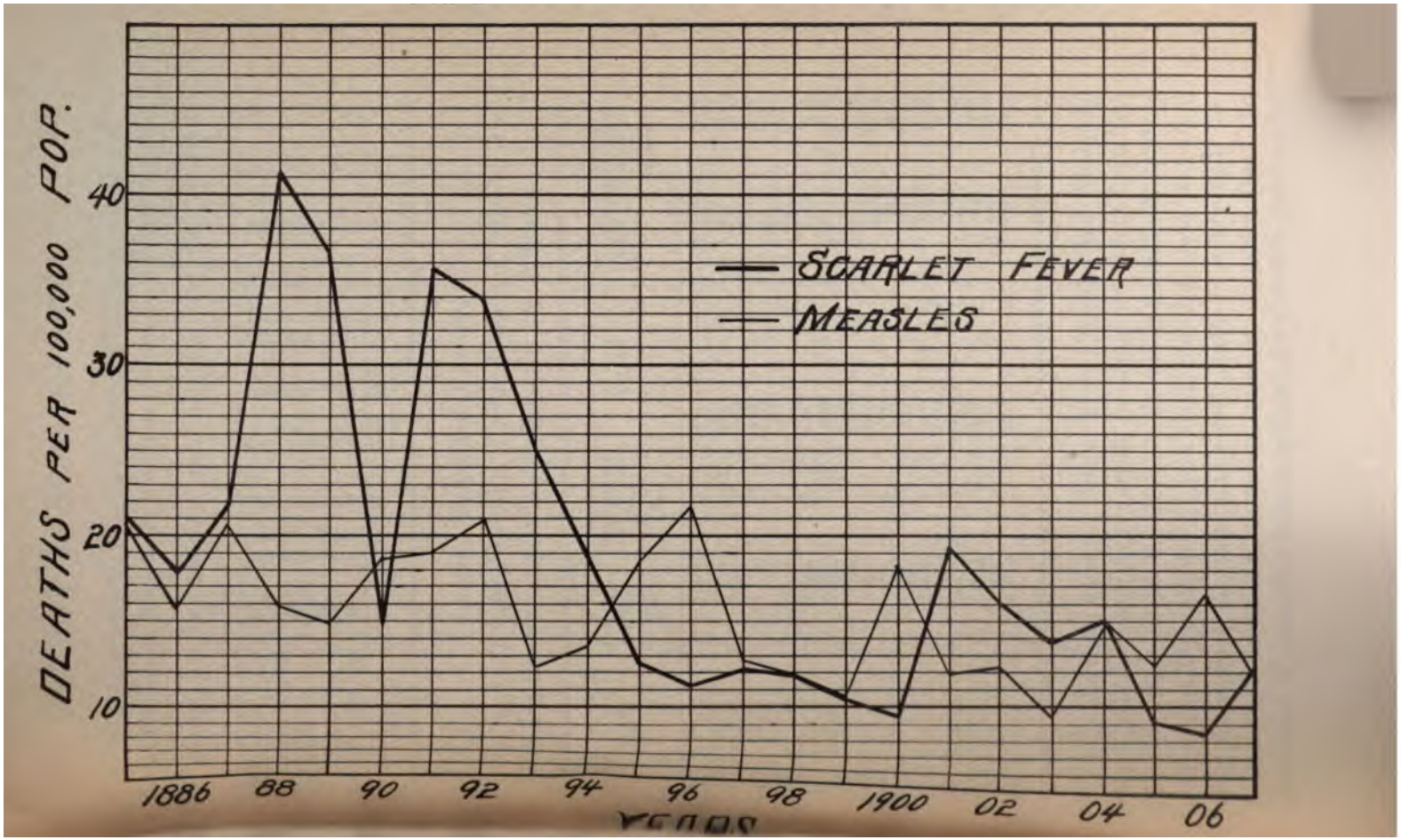
The above table and diagram well illustrates the marked inf ence the ever increasing use of antitoxin has had in decreas the mortality from diphtheria. As would be expected, there slight variations from year to year, due to alterations in gene conditions, such as virulence of the pathogenic bacteria and the susceptibility of man, but the general trend is toward a stea decline in the number of deaths from this disease, and this decli corresponds with the increase in the use of the specific reme and preventive agent, diphtheria antitoxin.

There is every reason to expect that this mortality will be s further materially reduced during the next five years.

Deaths from Diphtheria per 100,000 *population in the —*

DISTRICTS.	1898.	1899.	1900	1901.	1902.	1903.	1904.	1905.	1906.	1
Maritime	50.3	54.9	63.7	55.3	52.6	54.6	51.3	37.5	43.5	
Hudson Valley	30.8	33.5	37.5	33.7	25.1	19.4	23.2	21.1	22.9	
Adirondack and Northern	15.1	13.7	18.7	23.3	11.4	14.1	16.0	10.2	16.3	
Mohawk Valley	22.2	28.1	32.2	34.1	28.5	22.5	24.6	15.6	25.4	
Southern Tier	17.0	17.6	26.8	18.5	27.9	17.2	23.5	16.1	13.7	
East Central	22.8	11.7	15.2	15.8	10.8	12.2	14.3	8.6	10.5	
West Central	7.6	18.9	22.1	8.8	10.4	12.6	15.2	11.7	8.4	
Lake Ontario and Western	21.1	22.8	23.2	26.7	22.9	34.5	32.7	25.5	26.4	
Entire State	36.9	38.8	45.5	40.7	37.7	39.2	38.5	28.5	32.7	


MORTALITY FROM DIPHTHERIA.
DEATHS PER 100,000 POPULATION
110
100
90
80
70
60
50
40
1886
88
90
92
94
96
98
1900
02
04
06


DEATHS PER 100,000 POP.
40
30
20
10
SCARLET FEVER
MEASLES
1886
88
90
92
94
96
98
1900
02
04
06
YEARS



In each 1,000 *deaths there were from Diphtheria in the—*

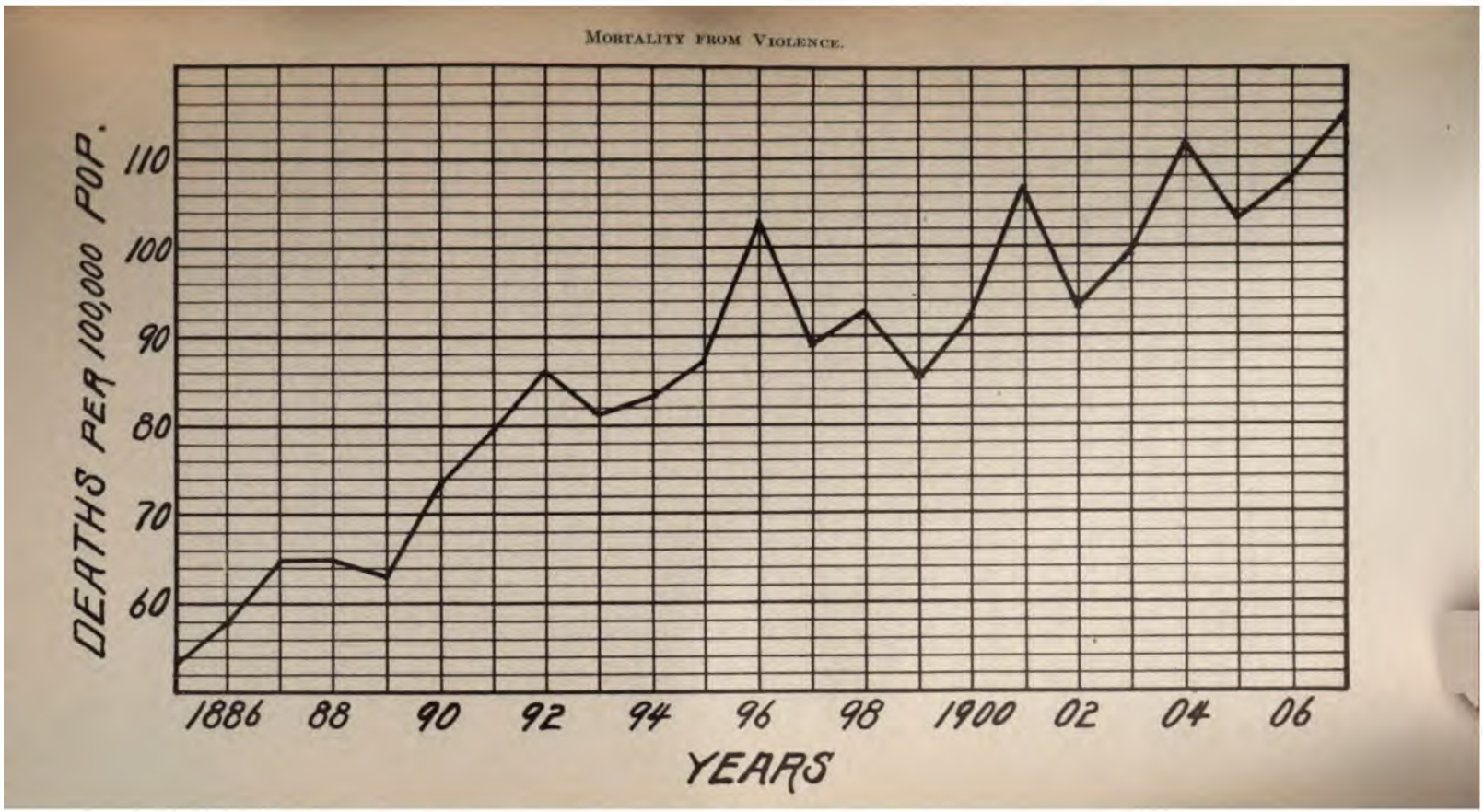
DISTRICTS.	1898.	1899.	1900.	1901.	1902.	1903.	1904.	1905.	1906.	1907.
[illegible]	21	28	32	28	28	31	26	21	24	21
[illegible] Valley	18	19	21	20	16	12	13	12	13	17
[illegible]dock and Northern	11	10	14	17	9	10	11	7	11	11
[illegible]k Valley	15	19	20	22	20	16	15	11	15	10
[illegible]ern Tier	13	13	20	13	21	14	19	11	9	13
[illegible] Central	16	9	10	11	8	9	9	6	7	10
[illegible]st Central	6	12	15	8	8	8	10	7	5	9
[illegible]ke Ontario and Western	16	16	16	18	17	22	22	17	17	12
Entire State	22	23	25	23	23	24	21	17	19	18

Scarlet Fever and Measles

The reported mortality from scarlet fever and measles, and deaths per 100,000 population is shown by the following:

YEAR.	Deaths from scarlet fever.	Deaths per 100,000 population from scarlet fever.	YEAR.	Deaths from measles.	Deaths per 100,000 population from measles.
[illegible]	1,184	21.1	1885	1,170	20.8
[illegible]	1,011	17.7	1886	895	15.6
[illegible]	1,267	21.7	1887	1,205	20.7
[illegible]	2,452	41.2	1888	944	15.9
[illegible]	2,205	36.4	1889	899	14.8
1890	913	14.8	1890	1,161	18.8
1891	2,252	35.6	1891	1,200	19.0
1892	2,177	33.8	1892	1,350	20.9
1893	1,626	24.8	1893	789	12.1
1894	1,227	18.8	1894	900	13.5
1895	850	12.6	1895	1,266	18.8
1896	759	11.1	1896	1,495	21.8
1897	841	12.1	1897	873	12.5
1898	837	11.8	1898	838	11.8
1899	730	10.2	1899	756	10.5
1900	689	9.4	1900	1,333	18.3
1901	1,430	19.2	1901	859	11.6
1902	1,215	16.0	1902	929	12.2
1903	1,057	13.6	1903	721	9.3
1904	1,194	15.1	1904	1,170	14.8
1905	726	9.0	1905	988	12.2
1906	690	8.4	1906	1,369	16.6
1907	1,032	12.2	1907	997	11.8

There are three diseases, Scarlet Fever, Measles and Whooping Cough, which have a characteristic in common different from that of other diseases of the preventable group — that of variable yearly mortality. While typhoid fever and diphtheria year after year show much the same number of deaths or a gradually increasing or decreasing mortality, possibly changing from the prevalence of some considerable epidemic for a certain year, scarlet


MORTALITY FROM VIOLENCE.
DEATHS PER 100,000 POP.
110
100
90
80
70
60
1886
88
90
92
94
96
98
1900
02
04
06
YEARS

In each 1,000 *deaths there were from Scarlet Fever in the —*

DISTRICTS.	1898.	1899.	1900.	1901.	1902.	1903.	1904.	1905.	1906.	1907.
Metime	10	8	6	15	13	10	11	6	6	9
Hudson Valley	2	2	4	7	5	7	3	4	1	3
Adirondack and Northern	1	4	4	6	6	4	5	2	2	1
Mohawk Valley	2	2	3	4	13	11	11	6	7	3
Southern Tier	3	5	5	3	5	5	9	3	1	3
East Central	4	3	3	5	2	2	6	9	4	3
West Central	2	5	3	2	1	1	1	2	2	3
Lake Ontario and Western	3	5	5	4	4	6	2	5	4	4
Entire State	7	6	5	11	11	8	8	5	5	7

In each 1,000 *deaths there were from Measles in the —*

DISTRICTS.	1900.	1901.	1902.	1903.	1904.	1905.	1906.	1907.
Metime	11	6	10	7	11	7	14	8
Hudson Valley	10	5	2	3	8	9	5	4
Adirondack and Northern	9	15	5	3	1	11	3	2
Mohawk Valley	11	8	3	3	2	5	1	4
Southern Tier	6	5	5	2	9	2	1	4
East Central	8	13	2	5	4	4	3	1
West Central	5	6	3	3	3	4	3	2
Lake Ontario and Western	10	5	7	6	3	11	4	7
Entire State	10	6	8	9	10	8	10	7

Deaths from Violence

The reported mortality from Violence and deaths per 100,000 population due to accidents is shown by the following:

YEAR.	Deaths from violence.	Deaths per 100,000 population.	YEAR.	Deaths from violence.	Deaths per 100,000 population.
1885	2,994	53.3	1897	6,172	88.7
1886	3,296	57.6	1898	6,520	92.4
1887	3,780	64.7	1899	6,093	85.0
1888	3,842	64.6	1900	6,714	92.2
1889	3,834	63.2	1901	7,926	106.6
1890	4,542	73.4	1902	7,058	93.0
1891	5,028	79.6	1903	7,646	98.6
1892	5,543	86.1	1904	8,822	111.5
1893	5,295	80.9	1905	8,352	103.3
1894	5,487	82.7	1906	8,874	107.5
1895	5,889	87.3	1907	9,668	114.2
1896	7,022	102.6			

[illegible]

[illegible]

[illegible]

[illegible]

In each [illegible] Bright's Disease in the—

[illegible]	[illegible]	1904.	1905.	1906.	1907.
[illegible]	[illegible]	71	71	71	64
[illegible]	[illegible]	62	63	62	65
[illegible]	[illegible]	50	50	45	53
[illegible]	[illegible]	55	60	58	20
[illegible]	[illegible]	53	52	55	66
[illegible]	[illegible]	56	58	53	63
[illegible]	[illegible]	55	58	44	63
Central		50	50	47	50
Ontario and Western					
Entire State		60	62	65	64

Section of Vital Statistics of the American Public Health Association

In compliance with instructions received from you, I attended a meeting of the American Public Health Association held in Atlantic City, N. J., September 30 to October 4, 1907, and participated in the organization of a section of vital statistics.

The purpose of the organization is to bring about a closer official and personal association of the registration officials of the several countries represented in the American Public Health Association; to promote the introduction of effective systems of registering vital statistics; to aid in the adoption of uniform methods of collecting, preserving, correcting and compiling registration records and of publishing the statistical data derived therefrom in the most useful form, especially for sanitary purposes.

Several interesting papers were read during the conference, and a permanent organization perfected by the adoption of a constitution and the election of the following officers:

Chairman, Dr. J. N. Hurty, Indianapolis, Ind.
Vice-Chairman, Dr. Chas. A. Hodgetts, Toronto, Ont.
Secretary, Dr. W. R. Batt, Harrisburg, Pa.

The above officers of the Association, and the following gentlemen comprise the council: Dr. W. H. Guilfoy, New York city; Dr. Jesus E. Monjaras, Mexico City, Mexico; Dr. M. O. Herkard, Chicago, Ill.; Dr. Wm. C. Woodward, Washington, D. C.; Dr. Chas. Chapin, Providence, R. I.

The following committees were appointed: On Membership; Program; Publication; Legislation for Vital Statistics; Causes of Death and Revision of the International Classification; Mortality of Occupations; Forms and Methods of Statistical Procedure and Publication.

The next meeting of the section will be held during the session of the American Public Health Association in Winnipeg, Canada, in the fall of 1908.

Respectfully submitted,

F. D. BEAGLE,
Director.

SPECIAL REPORT ON VITAL STATISTICS

CORNELL UNIVERSITY, ITHACA, N. Y., *August* 1, 1908.

EUGENE H. PORTER, M.D., *Commissioner of Health, Albany, N. Y.:*

SIR:—I have the honor to submit the following report as Consulting Statistician upon the vital statistics of New York State in 1907.

The report is in two parts, one dealing with those estimates of population in the State and its several parts at the middle of each year which are indispensable for any work in vital statistics, the other interpreting the statistics by bringing the figures of registration into comparison with such estimates. The former step is first in time and in logic but its results are somewhat technical and of less general interest. For that reason the natural order has been inverted in the report, the interpretation coming first and assuming the correctness of conclusions reached in the second part. But it should be stated at the beginning that neither the method of making estimates employed by the United States Census Office nor that followed by the New York City Department of Health proved to be the best one for the State to use. This does not imply any criticism of their methods for their problems but results from the conclusion that, the problem before the State Department of Health being different, the method of handling it should also be different.

A comparison of the results of registration in New York State in 1907 with the results in any preceding year affords gratifying evidence that the completeness and the classification of the returns are far better than ever before. Previous to 1907 almost no interpretation of the vital statistics of New York State would have been of significance. And even now far too much use has to be made of estimates in distributing the crude totals. But the best way to secure improvement in this respect in the future seems to be to use to the uttermost what results are now available. The following discussion has been prepared with that conviction and in that hope.

PART I. THE VITAL STATISTICS OF NEW YORK STATE: 1907

I. DEATHS AND DEATH RATES

Vital Statistics embraces the statistics of deaths, of births, and of marriages and the ratio of each to the living population. The population is usually estimated for the middle of each year and the quotient obtained by dividing the number of deaths, births or marriages occurring in a given territory during a calendar year by the number of thousands of persons living in that territory in the middle of that year is what is called the death rate, the birth rate or the marriage rate. For example, 147,890 deaths were reported for New York State during the calendar year 1907.* The estimated population of the State July 1, 1907 was 8,425,333. The death rate thus was 147,890 divided by 8,425⅓ or 17.5 per 1,000 per year.

Vital statistics furnishes the only measure of the medical and sanitary progress of whole communities in the past and the best index to the places where the public health is below the normal and where remedial or preventive measures are especially needed. It will be well at the start to get some idea of how the death rate of New York State as a whole compares with that of other parts of the country and the world.

The death rate of New York State is larger than the usual rate in the United States. The death rates in 1907 for other states are not yet published. Those for 1906 are given in the following table, the states being arranged in the order of decreasing death rate. The figures are taken from the report of the Federal Bureau of the Census.† As the figures for a single year might be deemed inconclusive, another list is added giving the average death rates for the five year period 1901–1905. The list of states in the series for 1906 is longer because the number of registration states has increased from ten to fifteen.

* Including 448 delayed returns not in the figures at first published.
† Mortality Statistics: 1906, page 24.

SPECIAL REPORT ON VITAL STATISTICS

BY

Prof. Walter F. Willcox, Consulting Statistician

Country.	Average death rate 1901–1905.	Country.	Aver death 1901-
Ireland	17.6	Servia	
Switzerland	17.7	Bulgaria	
Finland	18.6	Austria	
France	19.6	Roumania	
Germany	19.9	Spain	
Italy	21.8	Hungary	

The preceding table shows that the three Scandinavian tries, the Netherlands, England and Scotland, have at the pr time a lower death rate and hence probably are in a more f able sanitary condition than New York State.

The smallest death rate is found in the Adirondack and N ern section of the State, the largest in the Maritime se New York State has been divided by the State Departme Health into eight sanitary districts, the boundaries of whic low the division lines between the counties. A map of sanitary divisions will be found on page 150. They furn convenient grouping of the counties having similar sanitary ditions and problems. In the following table these sanitar tricts are arranged in the order of decreasing death rate.

SANITARY DISTRICTS.	DEATH RATE IN		
	1901–1905.	1906.	1
New York State	17.1	17.1	
Maritime	19.0	18.2	
Hudson Valley	17.2	17.0	
Mohawk Valley	15.5	16.3	
West Central	15.0	15.6	
Lake Ontario and Western	14.9	15.5	
East Central	14.9	15.4	
Southern Tier	14.4	14.7	
Adirondack and Northern	13.9	15.1	

The preceding table shows that the Maritime District i only one in which the death rate in each instance was abov average for the State. That in the Hudson Valley District on the whole very slightly above the average. All the oth districts show a rate for each period below the average fo State, the minimum rate occurring in the Adirondack cou

igh death rate in the Maritime District is due to the rate York city; the high rate in the Hudson Valley District in six of its nine counties.

eath rate in each county in 1907 is given in the follow- e wherein the counties are arranged in order of death a highest to lowest.

County.	Death rate.	County.	Death rate.
d	21.3	Jefferson	16.2
er	19.2	Schoharie	16.2
rk	18.8	Erie	15.9
	18.5	Broome	15:8
	18.5	Wayne	15.8
	18.1	Onondaga	15.6
o	18.1	Livingston	15.6
a	18.0	Niagara	15.6
	17.9	Warren	15.4
	17.9	Monroe	15.4
	17.8	Allegany	15.3
	17.7	Essex	15.1
	17.5	Steuben	14.9
k State	**17.5**	St. Lawrence	14.9
	17.4	Schenectady	14.6
	17.4	Cortland	14.5
	17.2	Suffolk	14.4
	17.2	Orleans	14.4
	17.0	Ontario	14.4
	17.0	Genesee	14.3
	16.9	Wyoming	14.3
	16.9	Herkimer	13.9
	16.9	Franklin	13.9
ery	16.8	Delaware	13.9
	16.7	Chautauqua	13.9
s	16.5	Cattaraugus	13.7
ton	16.4	Rockland	13.6
	16.4	Lewis	13.6
	16.3	Nassau	13.4
	16.3	Clinton	11.5
ter	16.2	Hamilton	9.8

Examination of the list shows that there are two noteworthy areas in which the death rate is above the average for the State. The first embraces the four counties of New York city and about half the population of the State; the second includes six counties on both sides of the upper Hudson. There are three other counties, Schuyler, Chenango and Sullivan, which had a death rate in 1907 above the average for the State.

If the average death rate for each county during the ten years 1898–1907 be compared with the average death rate for the State during the same period 17.4 per 1,000, it appears that only five counties had a death rate above the State average. Of these five three, New York, Kings and Richmond, are in New York city, the other two, Rensselaer and Albany, are in the Hudson district. But if the records for all counties in the State had been complete for the decade probably the number of counties with a death rate above the average would have been nearer the thirteen shown for 1907 than five.

The death rate of New York city is larger and that of the rest of the State is smaller than the average for the State. The death rate of a great city is almost always larger than that of the region in which it lies. The denser the population the larger the death rate is a general principle of vital statistics. Indeed one English authority went so far as to state the relationship in mathematical terms, maintaining that the death rate varies with the sixth root, or, as he later claimed, the eighth root of the density. No such precise statement of the relationship is warranted by present conditions but the general principle holds. That New York city is no exception appears from the following figures.

DATE.	DEATH RATE OF—	
	New York city.	Rest of State.
1901–1905	18.6	1[illegible]
1906	18.4	1[illegible]
1907	18.5	1[illegible]

The figures show that the death rate of the rest of the State at least 2 per 1,000 below that of New York city.

The difference between the death rate of New York city and that of the rest of the State is steadily decreasing. The preceding figures indicate that the difference in 1907 was less than previously. Their evidence is supported by the following table showing the death rate of New York city and of the rest of the State for each of the ten years 1898–1907 since Greater New York was created.

DATE.	DEATH RATE OF —		
	New York city.	Rest of State.	Difference.
1898	20.4	14.5	5.9
1899	19.6	14.9	4.7
1900	20.6	15.0	5.6
1901	19.9	15.1	4.8
1902	18.6	14.1	4.5
1903	17.9	15.2	2.7
1904	18.5	17.3	1.2
1905	18.3	15.8	2.5
1906	18.4	15.7	2.7
1907	18.5	16.4	2.1

During the first five years the difference was not once less than 4 per 1,000; during the last five years it was not once more than 3 per 1,000.

The apparent increase in the death rate of New York State outside of New York city, 1898–1907, is probably due to an increase in the completeness of the returns.

That the death rates of New York city and the rest of the State have actually changed in opposite directions seems improbable. It may be that the apparent increase in the death rate for the rest of the State is only apparent and due to the greater care and completeness with which records are now made. If the change were due to a local cause of this nature it would probably be found only in New York State, but if it were due to general causes the tendency in adjoining states having similar conditions would probably be in the same direction.

The death rate in each State adjoining New York, except Pennsylvania which had no published records before 1906, and in New York State outside of New York city for each of the nine years 1898–1906 inclusive is given in the following table:

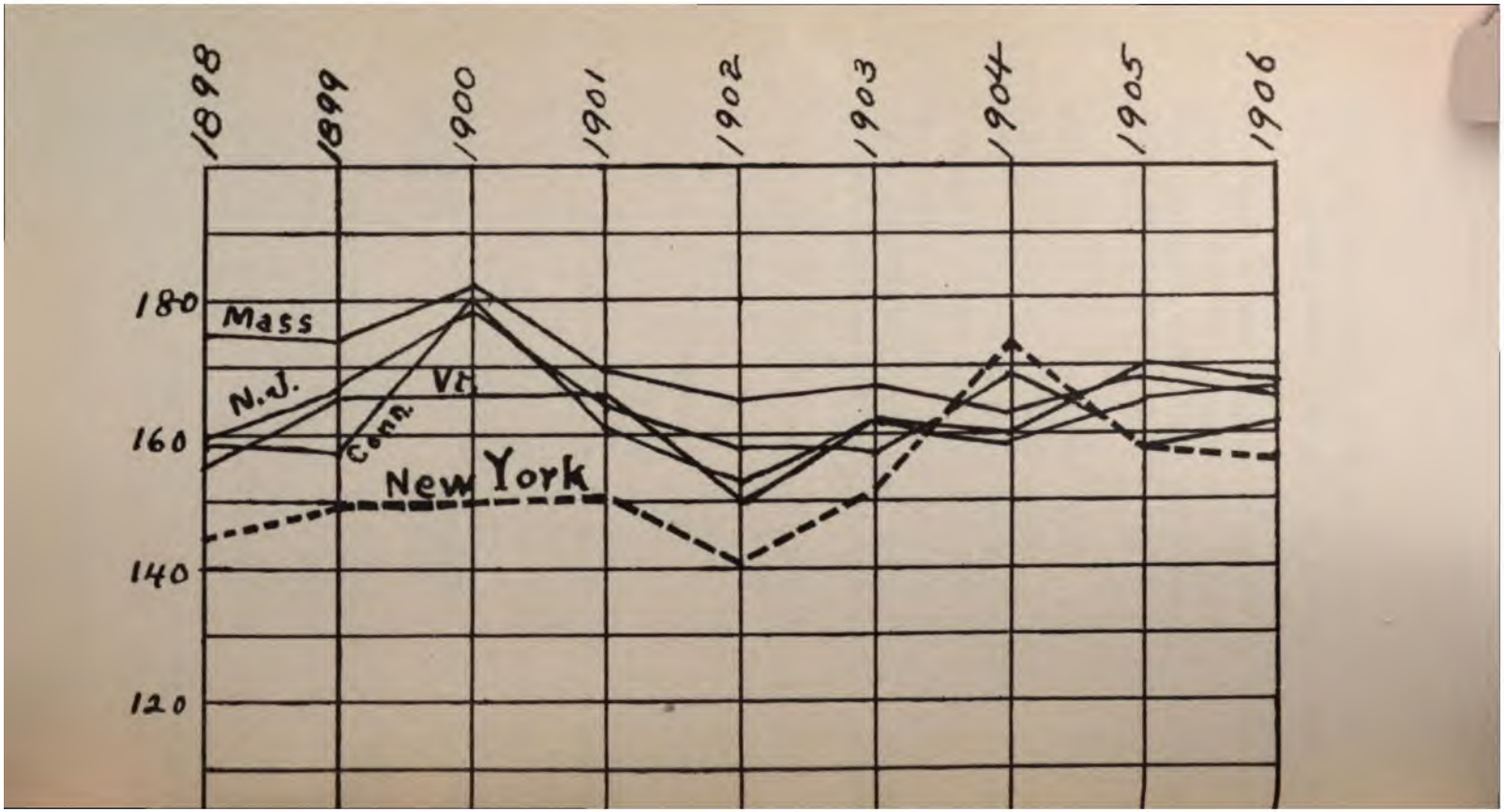
DATE.	DEATH RATE PER 1,000 IN				
	Vermont.	Massachusetts.	Connecticut.	New Jersey.	New York outside New York city.
1898	15.5	17.5	15.8	15.9	14.5
1899	16.5	17.4	15.7	16.7	14.9
1900	16.6	18.2	18.0	17.8	15.0
1901	16.6	16.9	16.1	16.4	15.1
1902	15.0	16.5	15.3	15.8	14.1
1903	16.2	16.7	16.2	15.7	15.2
1904	16.0	16.3	15.9	16.9	17.3
1905	17.0	16.8	16.5	15.8	15.8
1906	16.8	16.6	16.7	16.2	15.7

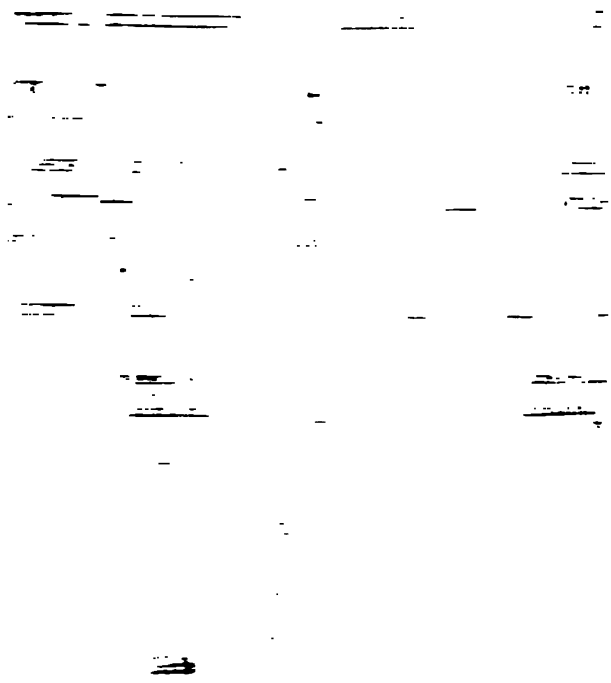
Perhaps the general trend of the foregoing figures appears more clearly in the following diagram on the opposite page.

An examination of their death rates shows that in no one of the states adjoining New York for which vital statistics exist has there been any noteworthy increase in the mortality. The following figures may be more significant than the preceding table:

STATE.	AVERAGE DEATH RATE PER 1,000.		Per cent. of increase (+) or decrease (−)
	1898–1902.	1903–1906.	
Massachusetts	17.3	16.6	−4
New Jersey	16.5	16.1	−4
Connecticut	16.0	16.3	+2
Vermont	16.1	16.5	+2
New York State, outside New York city	14.7	16.0	+9

The sharp increase in the death rate of New York State outside of New York city is apparently due in the main to a cause the influence of which does not extend beyond the State boundaries. That cause is probably the steady increase in the efficiency of the registration system of the State. The increase, therefore, is no proof of a heightened mortality, but rather an evidence that the State is rapidly approaching and may have already reached a stage when for the first time in its history its death rate and therefore its sanitary condition are susceptible of trustworthy measurement.


1898
1899
1900
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in the death rate of that city from tuberculosis and respir
diseases.

The diseases which press upon the population of New Yor
more heavily than upon the population of the rest of the Sta
as follows:

DISEASE.	DEATH RATE PER 100, IN 1907.		
	In New York city.	In rest of State.	Ex Ne
Diseases of the respiratory system other than pneumonia	182.4	92.2	
Pulmonary tuberculosis	210.3	130.5	
Diseases of the digestive system (diarrhea, enteritis, cirrhosis of liver, etc.)	240.8	190.6	
Pneumonia	145.0	115.5	
Diphtheria and croup	40.7	20.5	
External causes (accidents, suicide, sunstroke, etc.)	122.4	105.8	
Bright's disease	117.4	101.1	
Early infancy (premature birth, congenital debility, etc.)	90.9	75.0	
Scarlatina	18.6	5.6	
Measles	17.0	6.4	

The foregoing list includes all diseases or groups of di
in which the death rate of New York city in 1907 exceed
rate in the rest of the State by at least 10 per 100,000. T
difference for all causes of death was about 207 per 10
The figures show that the entire difference was less than t
ference under the heads of diseases of the respiratory system
than pneumonia, pulmonary tuberculosis and diseases of t
gestive system.

The excess in the city death rate from diseases of the re
tory system other than pneumonia may be due to the mo
curate diagnosis of these diseases by city physicians, they a
ing many deaths to pleurisy, bronchitis or bronchopneumon
like of which were returned by country physicians as d
pneumonia. Because of this possibility it might be faire
comparison between New York city and the rest of the St
combine the figures for pneumonia with those for other re
tory diseases. The death rate of New York city from all
in 1907 exceeded that for the rest of the State by almost e
its excess in mortality from tuberculosis and respiratory dise

On the other hand there are some causes of death more prevalent outside of the metropolis. Those in which this difference was at least 5 per 100,000 appear in the following list:

DISEASE.	DEATH RATE PER 100,000 IN 1907.		
	In New York city.	In rest of State.	Excess in rest of State.
Diseases of the nervous system (including apoplexy, meningitis, convulsions and paralysis)	132.5	212.2	79.7
Old age	16.0	48.7	32.7
Influenza	16.9	39.8	22.9
Diseases of the genito-urinary system other than Bright's disease	29.1	40.2	11.1
Diseases of the skin (gangrene, carbuncle, abscess, etc.)	5.1	11.6	6.5
Typhoid fever	17.3	22.4	5.1

Some of the foregoing are easily explained. Old age is an indefinite and unsatisfactory cause of death. The difference between city and country in this respect may be due to the greater care and accuracy with which death certificates are prepared in New York city or it may be due to the fact that a much larger proportion of the country population is aged. In 1900, 28 per 1,000 of the population of New York city and 66 per 1,000 of the population of the rest of the State were over sixty-five years of age. Probably both influences co-operated in causing the difference in the figures. So, too, influenza is seldom directly fatal except among the aged. On the other hand typhoid fever is certainly more prevalent in country districts than in cities like New York with a satisfactory water supply.

The death rate of males in New York State is much higher than that of females. Assuming that the proportion of the sexes in the estimated population of 1907 was the same as that in the enumerated population of 1900 the following results are reached:

SEX.	Estimated population in 1907.	Deaths reported in 1907.	Death rate.
Male	4,189,870	80,156	19.1
Female	4,235,463	67,702	16.0
Total	8,425,333	147,442	17.5

If this estimate were correct the death rate of males would be 1.6 per 1,000 or 9 per cent. above, and that of females 1.5 per

1,000 or 9 per cent. below, the average for the total population. In 1900 the male death rate was 6 per cent. above and the female death rate 6 per cent. below the average.

Either the difference between the two sexes has increased rapidly or the proportion of the sexes has altered since 1900. The latter is the more probable explanation. Between July 1, 1900 and July 1, 1907, immigrants arrived at the port of New York as follows:

Males.	3,362,194
Females.	1,330,914
Excess of males.	2,031,280

No doubt many more males than females departed from New York State for other states or countries and probably many more females than males entered the State from other states but still the net result of all these changes has probably been to increase the proportion of males in the State. The figures for 1900 are probably the better indication of the excess in the male death rate.

This higher death rate of males is not due to the greater risk of accident or disease among men during their working years. It is not uncommon to explain the higher death rate of males by their greater liability to industrial accidents or to diseases resulting from certain occupations. If this explanation were sound the higher death rate would be found mainly or entirely in the ages where such occupations engage the largest proportion of the population. The deaths in 1907 were not classified by age and sex both and consequently do not permit a test of the explanation. But the death rates for the census year 1900 can be computed by sex and age. If that be done and then the death rate for males at each age period be divided by the death rate for females at the same age period, the result is a series of ratios indicating by what per cent. the former exceeds the latter. The following figures give the result:

Relation between Male and Female Death Rates for New York State: 1900.

Age Period.	Ratio of Male Death Rate to Female = 100.	Age Period.	Ratio of Male Death Rate to Female = 100.
All ages	113	30–34	115
Under 1	123	35–39	119
1	114	40–44	120
2	108	45–49	122
3	104	50–54	122
4	101	55–59	114
5–9	103	60–64	109
10–14	99	65–69	111
15–19	107	70–74	104
20–24	109	75–79	113
25–29	113		

The foregoing figures show that on the average the male death rate exceeded the female by 13 per cent. They show also two periods in which the difference was greatest, one in early infancy, the other between 35 and 54 years of age. They indicate further than between 2 and 24 years of age the difference was less than the average and between 25 and 34 it was very near the average. There was only one period of life, 10 to 14, in which the male death rate was below the female. Clearly a difference so uniform in its occurrence and so distributed throughout life cannot be explained by any theory of a difference in the incidence of accidents or of occupational diseases.

The healthiest time of life is between 5 and 20 years of age; the unhealthiest is early infancy and extreme age.

The deaths recorded in New York State in 1907 have been classified by age as follows:

Under 1 year	28,011
From 1 to 4 years	12,157
From 5 to 9 years	3,260
From 10 to 19 years	5,220
From 20 to 39 years	24,901

From 40 to 59 years	29,583
From 60 to 79 years	34,668
80 years and over	9,924
Unknown	166
Total	147,890

These figures show that the largest number of deaths occurred between 60 and 80 years of age. They also indicate that the number of deaths during the first year of life was more than sixteen times the average number in any single year of age between 60 and 80. But there may be sixteen or more than sixteen times as many infants under one as of persons between 60 and 61. So these figures of themselves throw no light upon the danger of death or the death rate at each age.

A rough approximation to such death rates may be found by distributing the estimated population July 1, 1907 in the same proportions as obtained among the population of known age June 1, 1900. The 166 decedents of unknown age in the preceding table have also been distributed according to the proportions prevailing among decedents of known age. In this way the death rates at eight age periods have been obtained as given in the following table. For purposes of comparison the death rates for the same age periods in 1900 are also introduced.

AGE GROUP.	Estimated population in 1907.	Deaths in 1907.	Death rate, 1907.	Death rate, 1900.
All ages	8,425,333	147,890	17.5	18.
Under 1	185,187	28,042	151.4	167.
1–4	689,509	12,171	17.6	22.
5–9	828,525	3,264	3.9	4.
10–19	1,491,077	5,226	3.5	3.
20–39	2,990,139	24,929	8.3	9.
40–59	1,606,532	29,616	18.4	17.
60–79	584,145	34,706	59.4	55.
80 and over	50,219	9,936	197.8	191.

The preceding figures show that the death rate under one year of age is extremely high, that the death rate between one and

5 is slightly above the average for all ages, that the healthiest period of life is found between 5 and 20 years of age and that between 5 and 40, or thereabout, the death rate is below the average for all ages. It shows also that the death rate falls with much rapidity during the early years of life to a minimum at about the age of puberty, when the vital forces attain their maximum power to resist death, and rises more slowly with advancing age, so that it is not until about the age of 80 that the death rate comes to exceed what it is during the first year of life. The figures suggest, also, what rates for the whole registration area of the United States and for all of England and Wales establish for those regions, that there was a marked tendency between 1900 and 1907 to a decrease in the death rate at each age up to about 55 or 60 years but at later ages the tendency is for the risk of dying or the death rate to increase. For a more refined analysis of the death rate by age, more complete returns of the deaths, a more detailed age classification of deaths, and more trustworthy figures of the age grouping of the total population are indispensable.

The apparent death rate of Negroes in New York State is much higher, that of Indians and Mongolians much lower, than the death rate of whites. If the estimated population of New York State in 1907 be distributed to the four main races by the method used in the second part of this report for distributing it to the several sanitary districts, etc., the results set forth in the following table will be reached. It probably understates the number of Indians in the State. On dividing the reported deaths in 1907 for each race by the estimated population these death rates are obtained.

RACE.	Estimated population in 1907.	Deaths reported in 1907.	Death rate.
Total	8,425,333	147,890	17.5
White	8,282,102	144,367	17.4
Negro	127,223	3,401	25.9
Mongolian	11,795	87	7.4
Indian	4,213	35	8.3

The very low death rate among the few Mongolians in the State may be due entirely, and doubtless is due in large part, to the very small proportion of children and elderly persons and the very large proportion of young adults among them. In the total population of New York State in 1900 the death rate at ages between 5 and 24 was below 7.4, the apparent death rate of our Mongolian population. The reported death rate is not entirely impossible for a population of unusual age composition but it is so improbable as to arouse the suspicion that not all the deaths among Mongolians were properly recorded with specification of race.

For the Indian population no such explanation of the low death rate can be found. The proportion of children and elderly persons among the Indians must be approximately the same as among the general population. The conclusion from the figures is unavoidable that a considerable proportion of deaths among the Indians in this State are not properly registered with specification of race. No inference therefore can be drawn regarding the death rate among this class of our population.

The death rate among the Negroes, 25.9, is probably a close approximation to the truth. It is confirmed and the death rate for the other two races are discredited by the following figure showing the death rates by race in New York for the calendar year 1900:

RACE.	Population enumerated June 1, 1900.	Deaths reported in 1900.	Death rate.
White	7,156,881	129,408	18.
Negro	99,232	2,743	27.
Indian	5,257	80	15.
Mongolian	7,524	121	16.

There is little doubt that the true death rate among the Indian population of the State is larger than 15.2. In fact omissions in the records of deaths may be suspected in all four cases, and the computed death rates would then be only minimum limits to the true rates.

Some further light upon the death rate by race is thrown by the figures for the registration states in 1900. These included the six New England states, New York, New Jersey, District of Columbia, Indiana and Michigan. The following table shows the death rate by race in that area in the calendar year 1900.

RACE	Population in 1900.	Deaths in 1900.	Death rate.
Total	19,960,742	343,217	17.2
White	19,544,821	332,810	17.0
Negro	388,198	9,954	25.7
Indian	13,539	272	20.1
Mongolian	14,184	181	12.8

The table shows that the death rate of Indians in the registration area, like that of the Negroes, is decidedly above the death rate of whites. It shows, also, that in those states as a whole the reported death rate of both Negroes and whites was somewhat less than the rates for those races in New York State.

II. BIRTHS AND BIRTH RATES

In the Report of the Division of Vital Statistics is a table (page 105), giving the number of births in the State each year, the estimated population at the middle of each year and the computed birth rate. That table shows for each year since 1893 inclusive a number of births somewhat larger than the number of deaths and thus indicates that the population of the State has a natural increase from its own loins quite apart from immigration and emigration. But the reported excess of births is slight and the birth rate low. A comparison with the birth rates of adjoining states and of England and Wales will show this fact.

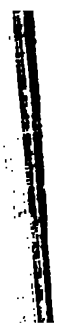
Birth Rates per 1,000 *Total Population.*

YEAR.	Vermont.	Massachusetts.	Connecticut.	New Jersey	Pennsylvania.	England and Wales.	New York.
1895	20.9	27.0	24.4	19.0	.....	30.3	21.1
1896	20.8	28.3	24.9	18.2	.....	29.6	21.5
1897	21.1	28.0	23.3	17.9	.....	29.6	20.8
1898	21.1	27.3	23.5	18.0	.....	29.3	19.7
1899	21.1	25.7	22.6	15.8	.....	29.1	19.1
1900	20.5	26.2	22.6	17.1	.....	28.7	19.7
1901	20.2	25.3	22.3	18.1	.....	28.5	18.9
1902	20.9	25.0	22.5	17.8	.....	28.5	19.3
1903	20.6	25.2	22.7	18.5	.....	28.4	20.4
1904	21.1	25.3	23.4	18.8	.....	27.9	20.8
1905	21.1	25.0	23.5	18.5	.....	27.2	21.3
1906	.....	.....	.....	19.4	24.1	27.1	22.2
1907	.....	.....	.....	.....	.....	.....	23.1

The preceding figures show that the apparent birth rate in New York State between 1897 and 1904, was lower than in any one of the adjoining states for which figures exist except New Jersey, and much lower than for England and Wales. But no inference from these figures in regard to the true birth rate of New York is warranted. It is practically certain that New York State has a higher birth rate than Vermont, extremely probable that her birth rate is as high as that of Connecticut or Massachusetts, and not unlikely that it is as high as that of England and Wales. The correct inference is that many births in New York State still go unrecorded in violation of the State law. The figures afford a gratifying indication, however, that conditions are improving. Since 1901 the apparent birth rate has risen steadily. This is evidence of a nearer approach to complete registration rather than of an actual rise in the birth rate. If the improvement thus indicated continues for the next five years the record of births may then be found approximately complete.

Examination of the birth returns by counties shows that nearly one third (19 out of 61) reported more deaths than births in 1907, and thus indicated a net loss of population. These nineteen counties were Albany, Allegany, Cayuga, Chemung, Chenango, Columbia, Fulton, Greene, Orange, Otsego, Putnam, Rensselaer, Saratoga, Schoharie, Schuyler, Sullivan, Tioga, Tompkins, and Yates, and their location is indicated on the accompanying sketch.


COUNTIES REPORTING MORE DEATHS
THAN BIRTHS IN 1907 HATCHED WITH
BLACK LINES



It is not likely that many of these counties actually lost population by an excess of deaths. In most cases probably, but not in all, the excess in unregistered births over unregistered deaths has converted an actual gain of population into an apparent loss. Few of these nineteen counties contain large cities, illustrating the general fact that in a city the maintenance of an efficient registration system is easier than it is in a scattered population.

III. MARRIAGES AND MARRIAGE RATES

A table in the Report of the Division of Vital Statistics (page 105), gives the number of marriages reported for each calendar year and the rate for each 1,000 persons. In the following table the marriage rates for New York State since 1895 are compared with those for adjoining states so far as the records are available.

Marriage Rates per 1,000 *Total Population*

YEAR.	MARRIAGE RATES PER 1,000 TOTAL POPULATION.					
	Vermont.	Massachusetts.	Connecticut.	New Jersey.	Pennsylvania.	New York.
1895	17.5	18.5	16.0	19.0	.....	17.6
1896	18.0	18.5	15.9	21.4	.....	17.2
1897	16.6	17.6	15.0	20.6	.....	16.6
1898	16.9	16.5	15.0	14.6	.....	16.2
1899	17.0	17.2	15.3	14.4	.....	17.0
1900	16.9	17.3	15.4	15.5	.....	17.4
1901	17.7	17.5	13.9	17.2	.....	17.6
1902	18.2	17.8	16.5	18.5	.....	18.2
1903	18.0	18.4	15.0	19.4	.....	18.8
1904	17.6	17.5	15.6	18.4	.....	18.8
1905	17.1	18.1	16.0	19.2	.....	19.4
1906	.....	.....	.....	19.7	17.1	21.4
1907	.....	.....	.....	.....	.....	22.6

The foregoing figures suggest what is probably a fact, that the registration of marriages in New York State is now more nearly complete than it is in the adjoining states and that the marriage rate in the State is a high one. To determine whether this inference is correct the following table has been prepared. It gives the marriage rate in 1903, the latest year for which figures are obtainable, for every country and American state publishing such figures.

Persons Marrying per 1,000 *Total Population:* 1903

Country.	Marriage Rate.	Country.	Ma
Uruguay.	9.4	Tasmania.	
Chili.	9.8	Austria.	
Ireland.	11.2	England and Wales...	
Queensland.	11.4	Belgium.	
Sweden.	11.6	Germany.	
Argentina.	12.0	Japan.	
Norway.	12.0	Hungary.	
South Australia.	12.5	Spain.	
Victoria.	12.6	New Zealand	
Finland.	12.6	Roumania.	
New South Wales.....	13.7	*Maine*.	
Portugal.	14.0	*Vermont*.	
Scotland.	14.1	*Massachusetts*.	
Denmark.	14.2	Western Australia ...	
Italy.	14.3	**New York**.....	
Netherlands.	14.9	Bulgaria.	
Switzerland.	14.9	Servia.	
Connecticut.	15.0	*Rhode Island*	
France.	15.1	*New Jersey*	
		Michigan	

The table shows that the American states which publish records have in general a high marriage rate, and that only igan, New Jersey and Rhode Island among the eight Ame states and only Bulgaria and Servia among the foreign countr the table have a higher marriage rate than New York State.

The marriage rates in each of the eight sanitary distri New York State in 1907 were:

	Persons marrying per 1,000 total population.		Persons m per 1,00 popula
East Central	16.0	Adirondack.	
Mohawk Valley	16.6	Lake and Western..	
Hudson Valley	16.6	Maritime.	
West Central	17.4	Southern Tier	

These figures show that the high marriage rate in New State is due largely, if not entirely, to the high rate in the time District and the almost incredibly high rate in the co

along the southern boundary of the State. To determine more exactly where these exceptionally high rates are found a table has been prepared showing the marriage rate in each county.

Marriage Rate in New York State by Counties: 1907

County.	Persons marrying per 1,000 total population.	County.	Persons marrying per 1,000 total population.
Nassau	12.6	Essex	18.0
Rockland	12.8	Tompkins	18.2
Lewis	13.6	Orange	18.4
Queens	13.6	Otsego	18.4
Hamilton	13.8	Washington	18.6
Oneida	13.8	Schenectady	18.8
Seneca	13.8	Wyoming	18.8
Orleans	14.4	Wayne	19.0
Herkimer	14.6	Dutchess	19.2
Sullivan	15.0	St. Lawrence	19.6
Genesee	15.0	Fulton	19.6
Suffolk	15.2	Cayuga	19.6
Cortland	15.2	Montgomery	19.8
Albany	15.4	Putnam	20.2
Yates	15.4	Monroe	20.4
Onondaga	15.6	Westchester	21.2
Ontario	15.6	Clinton	21.2
Richmond	15.8	Allegany	21.4
Madison	16.0	Warren	21.8
Schoharie	16.0	Jefferson	21.8
Greene	16.2	Erie	21.8
Rensselaer	16.2	**New York State**	**22.6**
Chenango	16.2	Steuben	23.8
Oswego	16.4	Schuyler	24.2
Ulster	16.8	Niagara	24.6
Delaware	16.8	Chemung	26.0
Livingston	16.8	New York	28.4
Columbia	17.4	Cattaraugus	30.8
Saratoga	17.6	Tioga	38.0
Kings	17.8	Broome	39.8
Franklin	17.8	Chautauqua	42.0

The marriage rate of Chautauqua, Broome and Tioga counties is twice as high as that of any known foreign country or American state. The probable explanation is that nonresidents in large numbers take advantage of the lax laws of the State regarding marriages and have their marriages solemnized in New York. A law which may decrease the proportion of marriages to nonresidents went into effect January 1, 1908.

The marriage rate of New York county, coextensive with Manhattan and Bronx boroughs of Greater New York, is shown by the table to be very much higher than the rate in Kings, Queens, or Richmond. The conjecture arises that this rate may be swollen by the marriage in that county of many nonresidents of the State. But an examination of New Jersey marriage rates by counties shows that Hudson county which lies just across the Hudson from New York county had a marriage rate of 19.0 in 1906. As New Jersey has a rate of 19.2 there is no evidence in either rate of a celebration in New York county of many marriages between residents of New Jersey.

The high marriage rate of New York city appears more clear when it is found that in 1906 the Administrative County of London with an estimated population of 4,721,217 reported 40,4 marriages and New York city the same year with an estimat population of 4,149,615 reported 48,355 marriages. The population of New York was about seven-eighths that of London, b the marriages in New York exceeded those in London by or fifth. The following table shows the marriage rates in the fo cities of the world each having at least two million inhabitan

Marriage Rate per 1,000 *Total Population.*

YEAR.	MARRIAGE RATE PER 1,000 TOTAL POPULATION.			
	London.	New York city.	Paris.	Berlin
1898	18.9	17.6	18.9	2
1899	18.7	18.2	19.1	2
1900	17.9	18.8	19.8	2
1901	17.6	18.8	20.1	2
1902	17.8	19.8	19.1	2
1903	17.5	20.0	19.0	2
1904	17.4	20.2	19.2	2
1905	16.9	21.2	.....	2
1906	17.1	23.4	.....	.....
1907	.....	23.8	.....	.....

The preceding figures for New York city and those in a foregoing table for New York State show that the marriage rate has apparently been rising for about ten years. As no such increase appears in the marriage rates of New Jersey, Connecticut, Massachusetts or Vermont, during the same period, it is safest to attribute the change to an increasing completeness in the registration of marriages. When Greater New York was first organized its apparent marriage rate was lower than that of London, Paris or Berlin. Its marriage rate in 1906 and 1907 was higher than that in any one of the other three cities in any year covered by the table. The marriage rate of Berlin and Paris has been about stationary, that of London has been falling, that of New York has apparently but perhaps not really been rising.

The rates for New York city in 1906 and 1907 conform well to what would be expected and suggest that nearly all the marriages are now recorded. But the wide differences between the boroughs of the city are still puzzling. It is hard to believe that the true marriage rate of New York county exceeds that of Kings county about three-fifths. Can it be that many residents of Brooklyn get married across the East river or that a large proportion of the marriages celebrated in Brooklyn still escape registration? The matter invites further investigation.

IV. STATISTICS OF TUBERCULOSIS

The State Department of Health has no trustworthy information regarding the number of persons now suffering from tuberculosis in New York State. But in its records of deaths it has approximately accurate returns regarding the number who succumb to this disease. In 1907 the number recorded as dying of any form of tuberculous disease including scrofula was 16,570 or about one-ninth (11.2 per cent.) of all the deaths in the State.

Regarding this figure two questions arise. How complete is the record of deaths? and, how accurately is tuberculosis diagnosed? There is little doubt that in many parts of the State, especially such as are sparsely settled, a small but significant proportion of

the deaths go unreported and unregistered. In consequence the true number of deaths from all causes is doubtless greater than the reported number. Regarding the accuracy of the diagnosis I can add nothing to this opinion of Dr. Hermann M. Biggs regarding the records of New York city "we may safely assume that several hundred deaths each year which should be ascribed to the tubercular diseases are ascribed to some other cause." If we should assume that this opinion expressed by Dr. Biggs in 1903 is still valid and that the errors of diagnosis throughout the State in 1907 bore about the same proportion to the reported cases that he supposed they did in Greater New York in 1903 we should add 1,035 cases of death really from tuberculosis but incorrectly ascribed to some other cause to the 16,570 reported as due to that disease making an estimated total of 17,605 deaths from tuberculosis in New York State in 1907.

Owing to the omissions in the registration record and to the errors in physicians' diagnoses, then, it seems probable that the number of 16,570 deaths reported to have occurred from tuberculosis is an understatement of the true figure.

Regarding the death rate by sex from tuberculosis it is best to recur to the figures of 1900. They show that the death rate from tuberculosis among males of all ages was 227 per 100,000 and among females 172 per 100,000, the rate for males exceeding that for females by about one-third. In 1890 the death rate of males in the State exceeded that of females by about one-seventh. This evidence that the difference between the sex incidence of tuberculosis is rapidly increasing is supported by English figures which show that between 1851 and 1860 the female slightly exceeded the male death rate from tuberculosis but that between 1891 and 1900 the male death rate exceeded the female by about 28 per cent. the rates for each sex agreeing closely with those for New York State in 1900.

Tuberculosis, more exactly pulmonary tuberculosis or phthisis, differs from nearly all other forms of disease in bearing most heavily upon the years of early adult life. The degree to which this held true for New York State in 1907 may be made apparent by the following method.

he deaths from all causes reported for New York State in
7 were:

Male	80,156
Female	67,702
Not stated	32
Total	147,890

istributing the "Not stated" according to the proportions
ailing among the others we have:

Male	80,172
Female	67,718
Total	147,890

hese 147,890 deaths are also classified into eight age periods
166 deaths of persons of unknown age. Distributing this
among the other eight we have the classification of deaths in
7 by age periods.

Age.	Deaths.
Under 1	28,042
1–4	12,171
5–9	3,264
10–19	5,226
20–39	24,929
40–59	29,616
60–79	34,706
80+	9,936
Total	147,890

The 140,626 deaths in New York State in 1906 have been classified in the Federal Report "*Mortality Statistics* 1906," into 24 age classes with the unknown, and the boundaries between the classes of the State Department of Health coincide with certain boundaries in the Federal Report. We may assume that the proportions of each larger group falling to each of the smaller contained groups were the same in 1907 as in 1906. By the aid of this assumption an estimated classification of the deaths in 1907 into 24 age groups may be reached as follows:

Age period.	Deaths in 1907.	
Under 1		28,011
1	6,592	12,157
2	2,767	
3	1,684	
4	1,114	
5–9		3,260
10–14	1,992	5,220
15–19	3,228	
20–24	5,113	24,901
25–29	6,078	
30–34	6,558	
35–39	7,152	
40–44	7,186	29,583
45–49	7,222	
50–54	7,420	
55–59	7,755	
60–64	8,916	34,668
65–69	9,242	
70–74	8,719	
75–79	7,791	
80–84	5,517	9,924
85–89	3,155	
90–94	939	
95+	313	
Unknown		166
All ages		147,890

The foregoing classification into age periods has been extended by assuming that in each group the proportion of male and of female deaths in 1907 was the same as the computed proportion in 1906. This assumption showing 340 fewer male and 340 more female deaths at all ages than the reported totals, the difference was then distributed to the computed male deaths by age and subtracted from the female deaths. The final result was the following table.

Estimated Classification of Deaths from All Causes in New York State by Sex and Age, 1907.

AGE PERIOD.	Total.	Male.	Female.
All ages	147,890	80,211	67,679
Under 1	28,011	15,562	12,449
1	6,592	3,519	3,073
2	2,767	1,492	1,275
3	1,684	901	783
4	1,114	590	524
5–9	3,260	1,759	1,501
10–14	1,992	1,015	977
15–19	3,228	1,757	1,471
20–24	5,113	2,685	2,428
25–29	6,078	3,359	2,719
30–34	6,558	3,747	2,811
35–39	7,152	4,269	2,883
40–44	7,186	4,334	2,852
45–49	7,222	4,326	2,896
50–54	7,420	4,252	3,168
55–59	7,755	4,281	3,474
60–64	8,916	4,730	4,186
65–69	9,242	4,798	4,444
70–74	8,719	4,338	4,381
75–79	7,791	3,815	3,976
80–84	5,517	2,628	2,889
85–89	3,155	1,436	1,719
90–94	939	386	553
95 +	313	108	205
Unknown	166	124	42

Regarding the deaths from tuberculosis in New York State in 1907, the published figures of the Department of Health show only the total number, already given, 16,570. The Federal returns give additional information for 1906, showing the distribution of deaths from tuberculosis in New York State to fifteen age periods. The total for 1907 has been distributed to these age periods in accordance with the proportions prevailing in 1906, and these subtotals have been further classified into twenty-

four age periods, and each of these into male and female de
in accordance with the proportions prevailing in the entire r
tration area in 1906. The result appears in the following t

Estimated Distribution of Deaths from Tuberculosis in New State by Age and Sex, 1907.

AGE.	Total.	Male.	Fen
All ages	16,570	9,197	
Under 1	476	261	
1	325	179	
2	198	107	
3	139	70	
4	72	39	
5–9	261	123	
10–14	280	94	
15–19	1,032	412	
20–24	1,959	916	
25–29	2,028	1,019	
30–34	2,188	1,217	
35–39	1,997	1,194	
40–44	1,469	924	
45–49	1,225	818	
50–54	897	611	
55–59	675	431	
60–64	487	300	
65–69	381	226	
70–74	244	132	
75–79	145	79	
80–84	61	29	
85–89	22	11	
90–94	2	1	
95+	2	1	
Unknown	5	3	

By combining the results of the two preceding computa
a table has been prepared showing the probable per cen
deaths for each sex and at each age period due to tubercu
The results of those computations follow.

Per Cent. that Deaths from Tuberculosis in New York State Make of Deaths from all Causes Classified by Sex and Age, 1907.

AGE.	PER CENT. THAT DEATHS FROM TUBERCULOSIS MAKE OF THOSE FROM ALL CAUSES.		
	Total.	Male.	Female.
Total	11.24	11.52	10.90
Under 1	1.70	1.68	1.73
1	4.93	5.09	4.75
2	7.16	7.17	7.14
3	7.78	7.77	8.81
4	6.46	6.61	6.30
5–9	8.02	7.01	9.21
10–14	14.00	9.23	18.96
15–19	32.13	23.57	42.35
20–24	38.46	34.35	43.15
25–29	33.47	30.44	37.21
30–34	33.35	32.48	34.52
35–39	28.00	28.06	27.92
40–44	20.46	21.34	19.12
45–49	16.97	18.92	14.06
50–54	11.83	14.38	9.03
55–59	8.70	10.07	7.02
60–64	5.47	6.36	4.48
65–69	4.14	4.73	3.50
70–74	2.81	3.05	2.57
75–79	1.87	2.08	1.67
80–84	1.11	1.11	1.11
85–89	.70	.77	.64
90–94	.22	.27	.18
95+	.68	.98	.52

The inferences from the preceding table may be thought of little importance because in its preparation so much use has been made of estimates.

To avoid this objection a similar table for the year 1906 and the entire registration area of the United States, including nearly one-half (48.8 per cent.) of the population of the country has been prepared.

Per Cent. that Deaths from Tuberculosis in the Entire Registration Area Make of Deaths from All Causes Classified by Sex and Age. 1906.

AGE	PER CENT. THAT DEATHS FROM TUBERCULOSIS MAKE OF THOSE FROM ALL CAUSES.		
	Total.	Male.	Female.
Total	11.53	11.62	11.42
Under 1	1.77	1.73	1.82
1	5.13	5.32	4.90
2	7.09	7.22	6.96
3	7.41	7.21	7.63
4	7.33	7.66	6.98
5-9	8.59	7.75	9.51
10-14	14.68	9.47	20.29
15-19	31.53	24.15	39.55
20-24	36.32	31.89	41.43
25-29	35.27	32.74	40.20
30-34	31.69	31.54	31.89
35-39	26.78	27.42	25.89
40-44	20.97	22.67	19.34
45-49	16.55	18.75	13.41
50-54	12.30	14.29	9.80
55-59	8.95	10.12	7.44
60-64	6.33	7.14	5.39
65-69	4.70	5.25	4.05
70-74	3.37	3.42	3.09
75-79	2.18	2.34	2.01
80-84	1.06	1.04	1.07
85-89	.74	.81	.65
90-94	.38	.41	.36
95 +	.65	.10	.44

The preceding tables show that certainly in the registration area and probably in New York State about one-ninth of all who die at any age, more than three-tenths of all who die between the ages of fifteen and thirty-five, and more than two-tenths of all who die between the ages of thirty-five and forty-five die of tuberculosis, and illustrate the very heavy incidence of tuberculosis on the years of youth and early adult life. When all ages are grouped together the proportion of deaths due to this disease is a little larger among males than among females, but at ages between five and thirty-five the proportion of deaths from tuberculosis among females is the larger and between fifteen and thirty fully two-fifths of all women who die die of tuberculosis.

Let us now ask the question: Assuming that either tuberculosis of the lungs or all forms of tuberculosis were completely eradicated from the population of New York State, all other conditions remaining the same, what would be the average gain to each person in the State expressed in terms of length of life?

This question can be answered accurately only by the aid of a life table for the total population of the State and we have not yet a sufficient body of trustworthy data regarding the deaths in the State classified by age to make it possible to compute such a life table which would be accurate enough to repay the labor of preparing it. But an answer accurate enough for present purposes may be obtained from English figures. The death rates for England and Wales 1881–90 from all causes, from pulmonary tuberculosis and from tuberculosis of any sort were not widely different from those prevailing in New York State. The conclusions reached for England and Wales, therefore, cannot be far from the truth for New York.

If there had been no pulmonary tuberculosis in England and Wales 1881–90, all other conditions remaining the same, the expectation of life of a child (male or female) at birth would have been about 2.6 years greater than it was. In other words a male child at birth would have on the average 45.9 years instead of 43.3 to live; a female child at birth would have on the average 49.2 years instead of 46.7 to live.

If there had been no tuberculosis of any sort in England and Wales, 1881–90, all other conditions remaining the same, the expectation of life of a child (male or female) at birth would have been about 3.8 years greater than it was. In other words a male child at birth would have on the average 47.2 years instead of 43.3 to live; a female child at birth would have on the average 50.4 years instead of 46.7 to live.

There is slight reason to doubt that these results would hold with little change for the population of New York State and that if all forms of tuberculous disease were suddenly to disappear, other conditions remaining the same, that one change would add about three and one-half years to the expectation of life of each person in the State.

Efforts are sometimes made to estimate the economic loss to the community caused by a single epidemic of disease like typhoid fever or by the steady drain upon the earning power of the State from a widespread and fatal disease like tuberculosis. Probably the most accurate and the most significant denominator in which to measure the loss is years of life and not thousands

of dollars. But neither form of statement excludes the other and for some purposes or to some minds a statement in terms of money may be more convincing.

In approaching this problem it is well to consider what efforts have been made previously to estimate the economic loss of a community from tuberculosis. Dr. Hermann M. Biggs in a paper printed in 1903 says: "It may be conservatively estimated that each human life at the average age at which the tubercular deaths occur is worth to the municipality $1,500. The cost of each life [evidently cost of production is meant] at this age is usually more than this. * * * We may further assume that for an average period of at least nine months these persons are unable to work and must be cared for. The loss of their service during this period may be estimated at $1 a day and the cost of food, nursing, medicines, attendance, etc., at $1.50 more per day making a further loss of $2.50 per day for each person dying for a period of 270 days."

Mr. Frederick L. Hoffman in a paper printed in 1904 says: "Tuberculosis causes annually more than 150,000 deaths in the United States at the average age of thirty-five years. At this age the normal after-lifetime is about thirty-two years, so that the real loss of life covered, measured in time, is represented by 4,800,000 years per annum. If we assume that the net value of a year of human life after age thirty-five is at least $50 the real loss to the nation * * * may be estimated at $240,000,000 per annum."

In the same year the Maryland Tuberculosis Commission reported: "Dr. Price has tabulated the figures regarding 177 wage earning males who died in Maryland from tuberculosis during the last year. * * * It may be assumed that they fairly represent the average condition in this State. * * * The [illegible] was computed (1) the total individual final loss in earnings, (2) the potential loss to the community. The latter can be readily computed by determining the annual income of the individual at the time of the onset of his disease and multiplying that by the number of years of expected life, as estimated by the figures of insurance companies.

"The average individual loss was found to be $741.64.

"The average potential loss to the community resulting from the death from tuberculosis of a wage earning male was $8,512.52."

In 1908 the New York State Department of Health said in its Annual Report (Extract page 8): "It is safe to say that tuberculosis costs the State of New York $70,000,000 annually." A letter from the Department gives the following explanation of the method by which the result was reached. "There are 14,000 deaths from tuberculosis in this State every year. Dr. Price estimates, I believe, the loss to the community through the deaths from tuberculosis of each wage-earning male in the State of Maryland as $8,000. I cut the same to $5,000 and multiplied the 14,000 deaths by the same and obtained thereby $70,000,000."

Another correspondent writes me: "I have taken the number of deaths from tuberculosis in a locality or state and put down each death as a loss of $500 to the State for the reason that the tuberculosis mortality is practically always during the working period and the average length of time that the individual is disabled before death is more than one year. Considering, therefore, the loss of a man's wages during the year that he is ill and putting that only at $250 and considering that during that year he must live and be supported which also comes to at least $250 each death means a loss of $500." The preceding are all the discussions of the subject which have come under my eye.

In considering the effect of tuberculosis upon the earning power of the community there are three conceptions which should be kept distinct, the cost of production, the loss from sickness, and the loss of prospective earnings.

1. If a youth dies at or before reaching the self-supporting age, those who have paid for his nurture would lose their outlay. The fact that they never expected to be reimbursed for it is irrelevant to the present problem. This outlay may be called the cost of production. If earnings have begun but not equalled the outlay, the difference between the two may be called net cost of production.

2. If each person dying from tuberculosis had died when he did but without previous impairment of his health or ability,

his economic value to family and community would clearly have been greater The difference between that economic value and his value under the actual conditions may be called the loss from sickness.

3. If a person dies of disease prematurely the present or discounted value of that person's earnings between the date of death and the end of his probable life diminished by the present value of his cost of future maintenance constitutes what may be called the prospective earnings.

Of these three notions the first, the cost of production, is important only because and so far as it throws light upon the last, the prospective earnings. The economic loss consists of the second and third combined, that is, the immediate or individual loss due to the sickness and the remote or social loss due to the destruction of prospective earnings.

In order to estimate the prospective earnings it is necessary to know the probable annual earnings for each future year, the probable cost of maintenance for that year, and the rate of interest at which these future sums should be discounted in order to compute their present value.

I am not aware that any serious effort has been made to obtain the information required for such a computation. The starting point is in the average annual earnings for a productive laborer in New York State. On this the widest basis available for recent years is the return of wages for persons engaged in manufacturing in 1905. These include 603,519 male wage earners at least 16 years of age and 98,012 clerks, salaried officials and firm members, a total of 701,531. Assuming that all of the latter class were males between 16 and 64 years of age the two together include 27 per cent. of the male population of productive age. The average annual earnings of the 604,000 wage earners was $579 that of the clerks, salaried officials and firm members was $1,134 and that of the two groups combined $657. The corresponding figures for 1890 and 1900 do not differ widely. No doubt the 364,000 adult males engaged in agriculture and the 408,000 engaged in domestic and personal service in 1900 earned less money on the average than those working in manufactures. Probably the 657,000 engaged in trade and transportation received not far

from the same average amount and the 108,000 in the professions, received more. On the whole and pending fuller information it seems fair to assume that the average man of productive age (16–64) in New York State earns about as much as an adult male wage earner in a factory, or say $580 a year. This may be compared with returns from 4,270 New York State families of wage workers and persons on salaries not exceeding $1,200 in which the husband earned an average income of $633. It may be further assumed that fully half of a man's earnings are used for the support of other members of the family. It is reasonable to assume then that the average man in New York State between 16 and 64 years of age earns not less than $1 a day more than is required for his own maintenance.

For the life table figures which are needed we may turn to the Massachusetts Life Table for 1893–1898, the only American table for a large, unselected and typical population. The method of William Farr illustrated in his "*Vital Statistics*," pages 531–537 and his article in Volume XVI of the Journal of the Statistical Society has been followed with some modifications. The present value of net prospective earnings has been obtained by discounting at 3½ per cent. per annum. As the earnings of a woman in any one of the manufacturing industries of New York State in 1890, 1900 and 1905 were between 50 and 56 per cent. of the earnings of a man, the net prospective earnings of a woman have been assumed to be one-half those of a man of like age.

In dealing with the mathematical problems arising at this point in the argument I have been much helped by my colleague, Professor James McMahon, who has kindly worked out their solutions and explained his methods in a supplement to this report.

Regarding the deaths from tuberculosis in New York State in 1907 the report of the State Department of Health shows only the total number, 16,570. But for 1906 we have more detailed information from the Federal Report "*Mortality Statistics* 1906" which distributes the deaths from tuberculosis in New York to 15 age periods. I have assumed that the percentages in 1907 were the same. These 15 groups were then subdivided into 24 age groups and each of those into male and female in accordance with the proportions prevailing in the entire registration area in 1906. The results are shown below.

Estimated Prospective Earnings Lost by Deaths from Tuberculosis in New York State, 1907.

AGE.	ESTIMATED DEATHS		PRESENT VALUE OF NET PROSPECTIVE EARNINGS			
			Per capita.		Total.	
	Male.	Female.	Male.	Female.	Male.	Female.
0–4	656	554	$1,859 70	$929 90	$1,220,000	$515,080
5–9	123	138	3,188 90	1,594 50	392,200	220,000
10–14	94	186	4,715 40	2,357 70	443,300	438,500
15–19	412	620	5,716 70	2,858 40	2,355,500	1,772,000
20–24	916	1,044	5,807 00	2,903 50	5,319,000	3,031,000
25–29	1,020	1,010	5,494 80	2,747 40	5,606,000	2,775,000
30–34	1,218	971	5,068 50	2,534 30	6,197,000	2,460,500
35–39	1,195	803	4,652 10	2,326 10	5,560,000	1,867,800
40–44	924	545	4,156 90	2,078 50	3,840,500	1,132,600
45–49	818	407	3,574 90	1,787 50	2,924,000	727,380
50–54	611	286	2,903 10	1,451 60	1,733,800	404,700
55–59	431	244	2,116 00	1,058 00	912,100	258,150
60–64	300	187	1,140 10	570 10	342,000	106,500
65–69	226	155	121 70	60 90	27,495	9,420
70–74	132	112	—725 00	—362 50	—95,680	—40,600
75–79	79	66	—1,288 50	—644 30	—101,800	—42,520
80–84	29	32	—1,313 20	—656 60	—38,080	—21,010
85–89	11	11	—1,009 00	—504 50	—11,099	—5,550
90–94	1	1	—746 30	—373 20	—746	—370
95–99	1	1	—460 00	—230 10	—460	—230
Total	9,197	7,373	.....	.....	$36,625,030	$15,608,437

The best estimate we have been able to make of the prese or discounted value of the prospective earnings lost in New Yo State in 1907 by premature deaths resulting from tuberculos is $36,625,030 plus $15,608,437 or $52,233,467.

But to this figure something should be added for the loss fro sickness. In order to estimate that loss it is necessary to knc the average number ill from the disease at any moment, t average length of time during which the disease impairs or d stroys earning power, the average length of time during whi the invalid requires nursing and medical attendance, the avera earning power of a healthy person. There are no American st tistical data with which I am acquainted on any one of the points. Hence no other method than that of expert guessing seen available under any of these heads. I am ready to accept sumptions made by Dr. Hermann M. Biggs in an estimate made 1903. He wrote, "We may further assume that for an avera period of at least nine months these persons (i. e. those w

died of tuberculosis) are unable to work and must be cared for. The loss of their service during this period may be estimated at $1 a day and the cost of food, nursing, medicines, attendance, etc., at $1.50 more per day making a further loss of $2.50 per day for each person dying for a period of two hundred and seventy days." This estimate indicates an economic loss of $675 from each case of tuberculosis resulting in death. If this be thought a large sum for an average it should be remembered as at least a partial counterweight that no allowance has been made for those many cases of tuberculosis which impair the earning power and involve some cost of attendance but do not cause death. If the conjectures of Dr. Biggs are accepted, the loss from sickness resulting from the 16,570 deaths from tuberculosis in New York State in 1907 would amount to $11,184,750. The final result of this study is indicated by the following statement of the economic loss to the population of New York State in 1907 from tuberculosis:

Loss of future earning power	$52,233,467
Loss from sickness	11,184,750
Total loss	$63,418,217

The probable error in the foregoing figures no doubt must be measured by millions of dollars. The method is believed to be fundamentally sound but the numerical assumptions still call for critical analysis and in some cases at least may be very wide of the truth.

Thus far we have been concerned only with human tuberculosis. The bases for an estimate regarding the loss from bovine tuberculosis are even more slippery. The neat cattle in the State in 1900 were valued at $62,735,174. I have obtained an expert opinion that at least one-tenth of these animals are tuberculous and that an animal suffering with the disease loses at least one-fourth of its value. The minimum reduction in the value of neat cattle in New York State then from bovine tuberculosis is $1,500,000.

In the light of all the evidence it seems admissible to conclude that the disease of tuberculosis in New York State at the present time reduces the expectation of life of each child at birth by two and one-half years and causes the population of the State an annual loss of about $65,000,000.

PART II. ESTIMATES OF POPULATION FOR NEW YORK STATE

In order to see the significance of the recorded figures for deaths, births and marriages in New York State for each year from 1885, when the records began to be significant, to 1907 inclusive, it is needful to know the population of the State in the middle of each year. As counts of the population were made only in 1880, 1890, 1892, 1900, and 1905, the only method of arriving at the population for the other years is by an estimate of some kind. This may be done by either one of two methods, the first assuming that the annual percentage of increase was the same for each year between any two censuses, the second assuming that the annual amount of increase was the same. The former seems the more reasonable method and is the one followed in England Massachusetts and New York city; the latter is found by experience to correspond much more closely to the average American conditions and for that reason is employed by the Federal Census Office.

The following figures show the percentages of decennial increase in the population of the United States and of New York State respectively for each ten-year period since 1870:

	Percentage of Decennial Increase	
Decade.	United States.	New York State.
1870–1880.	30.1	16.0
1880–1890.	24.9	18.0
1890–1900.	20.7	21.1

They show clearly that the rate of increase of population in the United States as a whole has been steadily falling since 187 but that the rate of increase in New York State has been steadi

rising. If the rate of decennial increase in this State be computed from the figures of the Federal census of 1900 and the State Census of 1905, it is found to be 23.2 per cent. showing that this rise in the rate of increase has continued. Under the circumstances prevailing in the United States as a whole as shown by these figures the method of estimating population adopted by the Census Office may be the best possible, but it is clearly inappropriate to the conditions prevailing in New York State. Under present conditions it is better to employ for this State the so-called Registrar-General's method, or method of assuming a constant rate of annual or decennial increase.

But this decision does not solve all the difficulties. There is little doubt among competent judges that the Federal census of 1890 in New York city and Brooklyn was erroneous, and that the published figures materially understated the populations of that date. There is as little doubt that the State enumeration of 1892, taken in the effort to substantiate claims previously made by the city and State governments that the count of 1890 suffered from serious omissions, was at least as erroneous in the direction of overstating the population. Estimating the population of New York city June 1, 1890, from the Federal figures of June, 1880, and the city figures of April, 1895, on the assumption that the rate of increase remained constant for the fifteen years, a total of 1,608,693 is reached. The Federal census of that date reported 1,515,301 indicating a deficiency of 93,392 in the enumeration. On the other hand estimating from the same figures the population of New York city February 14, 1892, a total of 1,689,782 is reached. The State census of that date reported 1,801,739 indicating an excess of 111,957.. Under these circumstances the best procedure apparently is to reject, so far as New York city is concerned, the Federal count of June, 1890, and the State count of February, 1892, and to assume that the city increased at a constant rate between June 1. 1880, and April 15, 1895. This conclusion has been reached independently by the writer and by the New York City Department of Health in its estimates.

In Brooklyn no census was taken by the municipal authorities in 1895. It is hardly credible that the Federal census of June

1, 1890, and the State census of February 14, 1892 were both correct and that the population of Brooklyn actually increased nineteen per cent. in twenty months. Probably the State count was nearer the truth and the Federal count is to be rejected.

Estimating the population of Brooklyn, from the results of the enumerations of June 1, 1880, and February 14, 1892, on the assumption of increase at a uniform rate a total of 886,684 is reached June 1, 1890, indicating that the total of 806,343 reached by the Federal enumeration of that city was too small by 80,341.

It is now possible to obtain the population of New York State June 1, 1890 and February 14, 1892 by substituting the estimates for New York city and Brooklyn in 1890 and for New York city in 1892 in place of the census figures. The results appear in the following table:

Date.	Population of New York State.
June 1, 1880	5,082,871
June 1, 1890	6,171,586
February 14, 1892	6,401,387
June 1, 1900	7,268,894
June 1, 1905	8,067,308

A test, although far from a conclusive one, of the accuracy of the foregoing results is the regularity of the series as indicated by the rate of annual increase. The results are as follows:

Period.	Average annual increase.
1880–1890	1.96 per cent.
1890–1892	2.16 per cent.
1892–1900	1.54 per cent.
1900–1905	2.11 per cent.
1880–1905	1.98 per cent.

The foregoing figures indicate a reasonably uniform series, but suggest that the corrected population for 1892 is still probably too large. The series however is the best that can be constructed unless the results of that census are to be rejected entirely, a degree of skepticism which seems greater than the facts require.

m the series thus given the population of New York State
ly 1st of each year since 1885, when the registration records
State began to be accurate enough for consideration, has
mputed on the assumption that the rate of annual increase
a the two successive enumerations was uniform. The re-
re given in the following table:

Population of New York State.

Date.	Estimated population July 1st.
1885.	5,609,910
1886.	5,719,855
1887.	5,831,947
1888.	5,946,246
1889.	6,062,764
1890.	6,182,600
1891.	6,316,333
1892.	6,438,283
1893.	6,537,716
1894.	6,638,696
1895.	6,741,246
1896.	6,845,375
1897.	6,951,111
1898.	7,058,459
1899.	7,167,491
1900.	7,281,533
1901.	7,434,896
1902.	7,591,491
1903.	7,751,375
1904.	7,914,636
1905.	8,081,333
1906.	8,251,538
1907.	8,425,333

purposes of computing death rates it is necessary to esti-
he population of the various parts of the State. The best
l for doing this is that described and employed in the last
ıial Supplement to the Registrar-General's Report.[1] It

[1] plement to the Sixty-Fifth Annual Report of the Registrar-General, 1891-1900, ges cxvii-cxxiv.

will easily be understood with the aid of an illustration. The following figures are derived from the Federal census of 1900 and the State census of 1905.

	POPULATION ENUMERATED JUNE 1.		PER CENT. DISTRIBUTION.	
	1900.	1905.	1900.	1905.
New York city	3,437,202	4,013,781	47.2864	49.7536
Rest of State	3,831,692	4,053,527	52.7136	50.2464
New York State	7,268,894	8,067,308	100.0000	100.0000

These figures show that on June 1, 1900, New York city contained 47.2864 per cent. of the population of the State and June 1, 1905, it contained 49.7536 per cent., an increase of 2.4672 per cent. in five years. If this increase went on uniformly during that period it would be 0.4934 per cent. each year and 0.0411 per cent. each month. On that assumption the population of New York city on July 1, of each year from 1898 to 1907 inclusive would be estimated from the figures for New York State given in the preceding table in the following way.

DATE.	Estimated population of New York State.	Per cent. in New York city.	Estimated population of New York city.
July 1, 1898	7,058,459	46.3407	3,270,939
July 1, 1899	7,167,491	46.8341	3,356,829
July 1, 1900	7,281,533	47.3275	3,446,131
July 1, 1901	7,434,896	47.8209	3,555,442
July 1, 1902	7,591,491	48.3143	3,667,828
July 1, 1903	7,751,375	48.8077	3,783,291
July 1, 1904	7,914,636	49.3011	3,902,073
July 1, 1905	8,081,333	49.7946	4,024,099
July 1, 1906	8,251,538	50.2880	4,149,615
July 1, 1907	8,425,333	50.7814	4,278,526

By a similar method the population of each sanitary district in the State has been estimated for each of the years between 1885 and 1907 inclusive of both. The results are embraced in the following table:

TABLE SHOWING ESTIMATED POPULATION OF THE STATE AND OF EACH SANITARY DISTRICT, ON JULY 1, OF SPECIFIED YEARS.

DATE.	State.	Maritime D.	Hudson.	Adirondack.	Mohawk.	So. Tier.	E. Central.	W. Central.	Lake & Western.
1885	5,609,910	2,490,435	665,124	380,643	354,277	384,212	385,109	304,090	646,020
1886	5,719,855	2,574,266	668,347	380,718	357,216	387,834	384,980	306,343	660,151
1887	5,831,947	2,660,427	671,443	380,639	360,134	391,451	384,698	308,568	674,587
1888	5,946,246	2,748,973	674,408	380,417	363,030	395,062	384,258	310,762	689,336
1889	6,062,764	2,839,962	677,222	380,042	365,899	398,663	383,651	312,923	704,402
1890	6,182,600	2,933,371	679,912	379,883	368,883	402,159	383,129	314,700	720,563
1891	6,316,333	3,028,321	682,637	383,887	373,345	404,541	385,277	312,524	745,800
1892	6,438,283	3,116,701	684,704	386,850	377,585	407,015	387,288	311,348	766,789
1893	6,537,716	3,191,484	685,838	388,050	381,443	409,784	389,155	312,136	779,826
1894	6,638,696	3,267,838	686,846	389,206	385,336	412,548	391,010	312,841	793,071
1895	6,741,246	3,345,794	687,721	390,297	389,264	415,314	392,805	313,508	806,539
1896	6,845,375	3,425,384	688,466	391,336	393,198	418,026	394,574	314,131	820,260
1897	6,951,111	3,506,626	689,070	392,306	397,179	420,743	396,303	314,683	834,201
1898	7,058,459	3,589,558	689,519	393,219	401,188	423,447	397,984	315,181	848,363
1899	7,167,491	3,674,220	689,825	394,061	405,228	426,128	399,630	315,627	862,772
1900	7,281,533	3,763,256	690,257	395,008	409,520	428,765	401,328	315,989	877,410
1901	7,434,896	3,884,439	693,731	397,837	416,506	431,093	403,790	316,232	891,268
1902	7,591,491	4,008,925	696,959	400,527	423,521	433,238	406,752	316,261	905,308
1903	7,751,375	4,136,963	700,057	403,200	430,688	435,324	409,365	316,194	919,584
1904	7,914,636	4,268,624	702,977	405,799	437,976	437,307	411,909	315,983	934,061
1905	8,081,333	4,403,995	705,710	408,333	445,370	439,180	414,378	315,624	948,743
1906	8,251,538	4,543,173	708,246	410,794	452,889	440,937	416,768	315,109	963,622
1907	8,425,333	4,686,262	710,579	413,178	460,528	442,574	419,076	314,433	978,703

The same method has been employed in estimating the lation of each county of New York State for each of th years 1898–1907 inclusive. The results are shown in the f ing table.

Table showing estimated population of each county in York State on July 1 of each year 1898–1907.

	New York.	Kings.	Queens.	Richmond.	Na
1898	1,966,088	1,117,700	191,723	65,699	
1899	2,009,953	1,142,980	146,630	66,145	
1900	2,055,927	1,169,513	153,573	66,984	
1901	2,119,250	1,206,127	162,034	67,999	
1902	2,184,300	1,243,600	170,438	69,368	
1903	2,251,172	1,282,038	179,597	70,330	
1904	2,319,848	1,321,515	189,154	71,733	
1905	2,389,851	1,362,150	199,120	73,128	
1906	2,462,192	1,403,796	209,509	74,071	
1907	2,536,747	1,446,500	219,850	75,429	

	Suffolk.	Westchester.	Rockland.	Orange.	Put
1898	77,188	171,980	36,124	103,115	
1899	77,545	178,264	37,297	103,562	
1900	77,903	184,812	38,414	103,924	
1901	78,485	193,514	39,784	104,866	
1902	79,391	202,077	41,086	105,800	
1903	80,266	211,056	42,463	106,634	
1904	81,125	219,894	43,824	107,506	
1905	81,931	229,510	45,137	108,288	
1906	82,251	239,979	46,511	109,113	
1907	82,929	250,290	47,799	109,914	

* *Nassau* formed from part of *Queens* in 1899.

	Ulster.	Dutchess.	Greene.	Columbia.	Alb
1898	89,858	82,428	31,860	43,695	
1899	89,101	82,019	31,654	43,422	
1900	88,374	81,703	31,459	43,232	
1901	88,064	81,704	31,413	43,174	
1902	87,722	81,741	31,353	43,103	
1903	87,425	81,772	31,288	43,021	
1904	87,034	81,705	31,195	42,952	
1905	86,605	81,676	31,122	42,879	
1906	86,144	81,555	31,030	42,762	
1907	85,662	81,481	30,922	42,623	

	Rensselaer.	Washington.	Warren.	Hamilton.	Es
1898	122,400	45,338	29,455	4,994	
1899	122,072	45,516	29,674	4,967	
1900	121,763	45,664	29,980	4,938	
1901	121,955	46,030	30,355	4,933	
1902	122,202	46,422	30,762	4,886	
1903	122,333	46,770	31,168	4,919	
1904	122,506	47,110	31,529	4,909	
1905	122,658	47,449	31,931	4,899	
1906	122,683	47,769	32,356	4,885	
1907	122,743	48,135	32,724	4,875	

	Clinton.	Franklin.	St. Lawrence.	Jefferson.	Lewis.
.....	47,851	41,725	89,510	76,060	27,965
.....	47,640	42,320	89,291	76,403	27,710
.....	47,405	42,940	89,124	76,801	27,420
.....	47,420	43,760	89,358	77,578	27,292
.....	47,381	44,618	89,559	78,299	27,118
.....	47,333	45,439	89,718	79,064	26,935
.....	47,315	46,259	89,890	79,779	26,786
.....	47,241	47,079	90,044	80,521	26,583
.....	47,195	47,896	90,168	81,210	26,413
.....	47,099	48,712	90,281	81,892	26,199

	Schenectady.	Schoharie.	Saratoga.	Montgomery.	Fulton.
.....	38,911	27,680	61,258	47,135	43,523
.....	43,037	27,350	61,149	47,330	43,199
.....	47,258	26,825	61,145	47,504	42,839
.....	51,858	26,533	61,479	48,025	42,778
.....	56,621	26,218	61,791	48,491	42,691
.....	61,499	25,929	62,059	49,009	42,595
.....	66,567	25,583	62,367	49,494	42,487
.....	71,780	25,241	62,690	49,954	42,395
.....	77,124	24,867	62,994	50,496	42,165
.....	82,660	24,456	63,229	51,023	42,001

	Herkimer.	Oneida.	Chautauqua.	Cattaraugus.	Allegany.
.....	50,625	132,056	84,732	65,182	40,671
.....	50,859	132,304	86,572	65,445	41,111
.....	51,064	132,885	88,421	65,692	41,503
.....	51,623	134,210	90,191	65,798	41,878
.....	52,219	135,490	91,898	65,918	42,243
.....	52,759	136,838	93,618	66,043	42,609
.....	53,328	138,150	95,310	66,136	42,956
.....	53,872	139,538	96,997	66,211	43,251
.....	54,481	140,762	98,699	66,223	43,577
.....	55,079	142,080	100,342	66,257	43,897

	Steuben.	Chemung.	Tioga.	Broome.	Sullivan.
.....	82,865	54,759	28,208	67,686	31,520
.....	82,85[illegible]	54,385	28,095	68,431	31,930
.....	82,830	54,049	27,927	69,211	32,348
.....	82,676	53,579	27,762	69,852	32,789
.....	82,494	53,127	27,585	70,475	33,355
.....	82,288	52,614	27,321	71,142	33,813
.....	82,057	52,097	27,122	71,740	34,351
.....	81,801	51,591	26,873	72,359	34,810
.....	81,517	51,028	26,658	72,924	35,299
.....	81,201	50,481	26,391	73,468	35,829

	Delaware.	Otsego.	Madison.	Chenango.	Onondaga.
1898	46,521	49,384	41,031	36,613	165,882
1899	46,477	49,153	40,800	36,567	167,270
1900	46,434	48,919	40,534	36,560	168,922
1901	46,514	48,774	40,382	36,584	170,703
1902	46,611	48,686	40,228	36,649	172,630
1903	46,708	48,507	40,036	36,719	174,883
1904	46,749	48,357	39,870	36,741	176,676
1905	46,821	48,191	39,653	36,798	178,601
1906	46,841	48,010	39,466	36,800	180,470
1907	46,849	47,815	39,227	36,794	182,303

	Cortland.	Cayuga.	Tompkins.	Seneca.	Schuyler.
1898	27,023	66,433	33,624	29,058	16,040
1899	27,333	66,345	33,737	28,561	15,938
1900	27,610	66,262	33,842	28,030	15,833
1901	27,984	66,125	33,931	27,512	15,718
1902	28,393	65,942	34,031	26,977	15,563
1903	28,779	65,765	34,085	26,404	15,409
1904	29,165	65,538	34,125	25,849	15,262
1905	29,504	65,276	34,149	25,250	15,117
1906	29,882	65,012	34,192	24,677	14,949
1907	30,259	64,677	34,145	24,239	14,745

	Ontario.	Yates.	Livingston.	Genesee.	Wyoming
1898	48,280	20,611	37,189	33,972	29,976
1899	48,991	20,450	37,121	34,278	30,206
1900	49,672	20,289	37,064	34,601	30,398
1901	50,312	20,145	36,969	34,880	30,640
1902	50,946	19,959	36,843	35,166	30,534
1903	51,570	19,796	36,742	35,412	31,020
1904	52,168	19,591	36,590	35,641	31,219
1905	52,740	19,379	36,454	35,887	31,372
1906	53,229	19,193	36,271	36,082	31,513
1907	53,762	18,926	36,093	36,248	31,598

	Oswego.	Wayne.	Monroe.	Orleans.	Niagara.	Erie.
1898	70,754	48,699	209,613	29,780	71 262	418,255
1899	70,743	48,750	213,865	30,025	73 59	426,220
1900	70,797	48,781	218,106	30,269	75,097	434,302
1901	70,676	48,753	222,384	30,477	76 914	442,105
1902	70,627	48,717	226,620	30,695	78 859	449,950
1903	70,457	48,666	230,965	30,905	80 848	457,982
1904	70,260	48,592	235,370	31,117	82 877	466,169
1905	70,140	48,501	239,752	31,319	84 947	474,494
1906	69,896	48,397	244,393	31,524	86 963	482,953
1907	69,723	48,276	249,024	31,755	89 109	491,415

Respectfully submitted,

WALTER F. WILLCOX,
Consulting Statistician

of all men above the age x can be found by merely replacing each w in formula 10 by the corresponding *e*. Thus

$$V_x = (1+\tfrac{1}{2}i)\,(P_x e_x v + P_{x+1}\, e_{x+1}\, v^2 + \ldots.) \quad \ldots\ldots(12)$$

5. *Average present value of net prospective earnings of a man at age x.*

This average value (v_x) is found by dividing the total V_x by 1_x the number of persons alive at age x, as given by the life tables; hence

$$v_x = \frac{V_x}{1_x} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(13)$$

6. *Mode of computing V_x and v_x from the formulae.*

When the data are arranged in five-year groups, it is convenient to denote by G_x the present value at age x of the net income earned by the whole group from age x to age x+5; then

$$G_x = (1+\tfrac{1}{2}i)\,(P_x e_x v + P_{x+1} e_{x+1} v^2 + P_{x+2} e_{x+2}\, v^3 + P_{x+3} e_{x+3}\, v^4 + P_{x+4}\, e_{x+4}\, v^5); \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(14)$$

and from this can be computed G_0, G_5, G_{10}.....G_{95}. (It will be observed that in our data the five *e* coefficients are constant throughout each group). The successive numbers V_{95}, V_{90}, V_{85}, ...are computed in this reverse order from the relation

$$V_x = G_x + v^5\, V_{x+5}. \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots(15)$$

the truth of which is evident from the fact that V_{x+5} is the value at age x+5 of all the net earnings above that age, and that the factor v^5 carries on this value to the age x. In applying this relation the term V_{100} is first found from the data for the last group (ages 100 to 102), by means of the formula*

$$V_{100} = (1+\tfrac{1}{2}i)\,(P_{100} e_{100}\, v + P_{101}\, e_{101}\, v^2 + P_{102}\, e_{102}\, v^3) \ldots(16)$$

which is a special case of formula 12, and V_{95} is then found by putting x = 95 in formula 15, giving

$$V_{95} = G_{95} + v^5\, V_{100}.$$

Similarly V_{90}, V_{85}.....are found from the relations

$$V_{90} = G_{90} + v^5\, V_{95},$$
$$V_{85} = G_{85} + v^5\, V_{90},$$
* * * *
$$V_5 = G_5 + v^5\, V_{10},$$
$$V_0 = G_0 + v^5\, V_5;$$

*For these formulae the Massachusetts life table (referred to by Dr. Willcox) has been assumed to run out at age 102, and we have taken $P_{101}=7$, $P_{102}=2$, $P_{103}=0$, $1_{101}=10$, $1_{103}=4$, $1_{103}=0$.

finally v_0, v_5, v_{10},.....are found by dividing V_0, V_5, V_{10}, ...by 1_0, 1_5, 1_{10},.....respectively, in accordance with formula 13.

7. *Mean prospective earnings for each group.*

The mean prospective earnings (v'_x) for a man in the group from age x to age x+5 is given by the approximate formula

$$v'_x = \tfrac{1}{2}(v_x + v_{x+5}) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (17)$$

thus, for instance, the net prospective earnings for each man in the group between the ages 20 and 25 is taken as

$$v'_{20} = \tfrac{1}{2}(v_{20} + v_{25}).$$

8. *Formula for the economic loss to the State of New York from the deaths due to tuberculosis in one year.*

Let D_x be the annual number of males dying from tuberculosis in the group between the ages x and x+5, then the economic loss (L_x) to the State due to these deaths is

$$L_x = D_x v'_x, \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (18)$$

and the total annual loss (L) is

$$L = D_0 v'_0 + D_5 v'_5 + D_{10} v'_{10} + \ldots\ldots\ldots\ldots\ldots (19)$$

9. *Numerical data and results.*

In applying these general formulae to the particular problem before us, the rate of interest is assumed to be $3\frac{1}{2}$ per cent., hence $1+i = 1.035$, and $v = .96618$. The value of P_x and 1_x are obtained from the life tables for the State of Massachusetts, which are presumed to indicate fairly the death rate in the State of New York at the various years of age, for the general population. The average annual wages for males (w_x) and the average cost of maintenance (m_x) which have been used in the calculations are shown in the following table, and are thought to conform fairly to modern American conditions.

Age Period	w_x	m_x	e_x
0–4	0	100	–100
5–9	0	150	–150
10–14	50	200	–150
15–19	400	250	150
20–24	600	300	300
25–29	600	300	300

* * * * * * * *

Age Period	w_x	m_x	e_x
60–64	600	300	300
65–69	500	300	200
70–74	375	300	75
75–79	200	300	–100
80–84	0	300	–300
85–89	0	300	–300
* * * * * * * *			

'rom the above data the values v_0, v_5 v_{10},.....have
ı computed as in section 6, and then v_0, v_5^1, v_{10}^1.....as
ction 7. The values of the latter series of averages are shown
ıe third column of Dr. Willcox's table. The values of D_x are
ı in the first column of that table; and those of L_x (found
ɔrmula 18) in the fifth column. The total yearly loss for
ɜ (L) is shown at the foot of the fifth column.

DIVISION OF COMMUNICABLE DISEASES



DIVISION OF COMMUNICABLE DISEASES

During the year 1907 there have been reported to this Department 26,351 cases of contagious diseases. In the early months of the year monthly reports came from health officers representing only 345 of the health boards of the State, being 24 per cent. of the total number of municipalities. From month to month the number of reports has steadily increased until in December they reached a total of 1,302 out of 1,422, or 91.5 per cent. of all the municipalities. About 20 municipalities submitted daily or weekly reports. Of those who made no reports doubtless many had no cases to report.

The energies of the Department in bringing about this extraordinary increase is evidenced by the fact that during the months of September, October, November and December, delinquent notices were issued to the number of 550. It would be a mistake, however, to assume that what amounts to almost a unanimous response from all the local health organizations of the State was merely the result of solicitation from the Department. It should rather be taken as convincing evidence of the rapid growth, wide diffusion and deep interest in matters of public health by local sanitary authorities everywhere throughout the State. It is a very significant fact as indicating how within a very short time an approach has been reached of almost a complete organization of the State machinery of sanitation.

While public interest in public health has experienced an extraordinary quickening from many causes, it is evident that a strong impetus toward central organization and unity of action exists among local boards. In the correspondence of this division, which has increased fourfold in the past year, there has been abundant evidence of a growing *esprit de corps*. It is a fair inference that while the rapid expansion of the Department's influence and authority has had a whole, a stimulating and inspiring effect on the individual municipal constituents, what has had most to do with this awakening has been the great yearly gatherings of health officers at the great Annual Conferences.

Reports of Contagious Diseases by Monthly Report Cards During the Year 1907

Consumption	2,137
Diphtheria	4,483
Scarlet fever	3,900
Measles	12,401
Typhoid fever	2,856
Cerebro-spinal meningitis	159
Smallpox	416
Ophthalmia	35

Reports by Individual Report Cards During the Year 1907

Consumption	665
Diphtheria	1,733
Scarlet fever	1,587
Measles	3,569
Typhoid fever	1,195
Cerebro-spinal meningitis	58
Smallpox	305
Ophthalmia	16

TUBERCULOSIS

In view of the preparation for an active campaign agai tuberculosis the registration of 2,137 from the State outside New York city and Buffalo is of interest. Undoubtedly profession everywhere is ready to take hold of the movement i spirit of most hearty co-operation and the almost complete re tration of the remaining 16,000 or more cases can be confiden predicted before the year is more than half gone.

DIPHTHERIA

The following experience of Dr. J. W. Small, Health Officer North Tarrytown, illustrates some of the difficulties of act practice among foreigners.

ALBANY, N. Y., *September* 24, 1907

J. W. SMALL, M.D., *Health Officer, North Tarrytown, N. Y.*

DEAR DOCTOR: — Your ten reports by card of diphtheria are hand and indicate an outbreak of unusual and alarming severi

I request that you will hereafter during the continuance of the outbreak report each case as soon as it is discovered, requesting the physicians of the village to co-operate with you therein.

The reports show that in five of the ten cases, antitoxin was not used at all; in four of them on the second day, and in one on the third.

Furthermore, if you report correctly, the serum was not used for immunizing purposes in a single instance, although the number of inmates of houses reported runs up into the hundreds.

Without assuming to criticise without having more details, I must urge upon you the free use of the State antitoxin upon every person entitled to receive it, not only as promptly as possible, but in as large doses as your judgment dictates and upon every person who will accept it who offers the least ground for supposing that he or she has been exposed; and to urge its similar use upon those who use the commercial article.

Pressure can be put upon people who object by explaining that their quarrantine will be shortened thereby. When there is determined opposition, enforce the rule of confinement until the last case in the household has convalesced, and shown clear cultures twice in succession.

Very respectfully,

EUGENE H. PORTER,
Commissioner of Health

NORTH TARRYTOWN, N. Y., *September* 27, 1907.

EUGENE H. PORTER, M.D., *State Commissioner of Health, Albany, N. Y.:*

DEAR SIR: — Your letter of 24th inst. is at hand and contents noted. I wish to give you a short history of the outbreak of diphtheria in this village so that you may judge the conditions correctly. The first outbreak and most of the cases have occurred among Italians. The first case was my own in the family of Giaquin, a little girl eight years old in a family of ten or twelve, three or four being children. The case was one of well developed

pharyngeal diphtheria when I first saw it which was the evening of August 20; it was probably two or three days old at that time. I isolated the patient and quarantined the premises at once. The next day I wanted to use antitoxin but the mother would not allow it; however, I used it on the third and fourth days and the patient made a good recovery; no other person in the house contracting it. I want to tell you right here that those people will not allow a doctor to use immunizing doses of antitoxin and it is sometimes as much as he can do to get permission to use it when the patient is in imminent danger. Neither will they observe a quarantine but will call in all their friends and neighbors when one of their family has a contagious disease. They are ignorant and dirty and hard to deal with.

The next case was that of Marasco, next door, at 104 Cortland street. Dr. Fleming attended that case and it was reported a few days after mine. This case was in the premises known as the Fitzgerald Flats, two large buildings filled with Italians and Hungarians, upward of 100 in each building. This family would not observe the quarantine and I had to place guards at their door to keep people from running in and out. Then there was a tremendous row made by the family, until at last the President of the Board of Health and I too, for that matter thought it better to disinfect the premises and let them ou No new cases occurred in this family. However, in the sam house up-stairs, a lady had a baby sick with diphtheritic cro about a week later. A doctor was called a few hours before child died, but he did not report the case to me neither was ever reported and I knew nothing of it until nearly a week af the child was buried. Then I fumigated the premises and trea the noses and throats of the children. One other case occurred a family having rooms adjoining these, which recovered.

September 12th a case of diphtheria was reported to me by D Brandt in the barber shop of Dominick Cerone at 194 Cortla street. I went at once to quarantine the premises but was t by Cerone that the man had gone to Dobbs' Ferry. In real he was concealed in the cellar under the barber shop. Rum coming to me about the case I investigated and found that Cer

had been covering up the case for fear it would injure his business. I reported the matter at once to the President of the Board of Health and it is now in the hands of the village counsel.

Now in regard to my method of fighting this epidemic. When a case is reported to me I go as soon as possible and quarantine the premises; that is, I have the patient isolated — send the men who work away from the premises and give strict orders that no one go in or out. I also leave the literature sent out by the State Department of Health. If it is my own patient or if I am sent by the local Board I treat the noses and throats of all the members of the family with a germicide solution which I have used for many years and which has never or seldom failed to prevent the disease coming on where it is faithfully used. I leave this solution and an atomizer with the family and direct that it be used several times a day. The solution consists of Phenol Liq gtt. xvi Ac. Salicyl. gr. i. Spts. Menth. Rip. gtt. iv. Aq. Calcis ℥ iv. S. To be used with atomizer. This may be used with children quite young, though I make it weaker for infants and it can be swallowed without doing any harm. Where I am called to see one patient in a family and this is used I seldom if ever have a second case. I have used it very successfully in this epidemic, no second case occurring where it has been used. It is not my custom to interfere in any way with the patients of other doctors but if the family is too poor or too ignorant to do so I go and disinfect and fumigate the premises after the patient is well a sufficient time. I generally use formaldehyde for this purpose. We have had about fifteen cases in all and two deaths of diphtheritic croup. I have now only three families in quarantine and expect to clear up one or two of those to-morrow. It is my custom to send you report of a case very soon after it is reported to me but I had no report cards though I had written for some. I wish you would send me a few more as these are nearly gone; also the literature from the State Department of Health printed in Italian and Hungarian if you have it. I dispense the State antitoxin to any doctor who gives a receipt for it.

I trust that you will excuse this poorly written letter. I have had many interruptions while writing it but I thought best to get

it to you as soon as possible so I have hurried through as quickly as I could. Hoping it may prove satisfactory to you I am

Respectfully yours,

J. W. SMALL, M.D.,
Health Officer

ALBANY, N. Y., *September* 30, 1907.

J. W. SMALL, M.D., *Health Officer, North Tarrytown, N. Y.:*

DEAR DOCTOR: — Undoubtedly you are under very many difficulties in dealing with the Italians. Perhaps we cannot expect any more of you than you are doing. I appreciate your suggestion for literature in Italian and Hungarian. Italian literature is now preparing, but not ready for distribution.

In general as to sanitary action against diphtheria, make antitoxin paramount. First, inject early; second, in the largest amount your judgment of the severity of the case dictates; third, use immunizing doses upon every exposed person.

If the situation should demand it, that is, if there were an alarming increase and danger of its dispersion generally, you will have to use more stringent measures.

Very respectfully,

EUGENE H. PORTER,
Commissioner of Health

The following correspondence on immunization indicates the policy of the Department, as also the practice of one of the most capable health officers of the State.

ALBANY, N. Y., *July* 26, 1907.

A. H. BROWN, M.D., *Health Officer, Auburn, N. Y.:*

DEAR DOCTOR: — From an analysis of the sixteen cases of diphtheria recently reported by you to this office, it appears that there were seventy-one persons, inmates of houses where the case originated. It is presumable that all were more or less exposed and it seems that only seventeen were immunized. Immunization is such an important sanitary safeguard that I would recommend your impressing on the profession in your city the ad

visability of its more extended use. It may help to cut short your epidemic.

Very respectfully,

EUGENE H. PORTER,
Commissioner of Health

AUBURN, N. Y., *July* 30, 1907.

EUGENE H. PORTER, M.D., *State Commissioner of Health, Albany, N. Y.*

DEAR DOCTOR: — Replying to yours of July 26th, relative to immunizing people exposed to diphtheria, permit me to say that in all cases physicians have been advised to adopt this method. I even have gone so far as to offer State antitoxin in all cases for purposes of immunization, which offer I trust meets with your approval. I find that physicians are gradually coming to adopt this method, but it requires time to bring them to a full realization of its importance. You may feel confident that I am in full sympathy with this method, and am doing all that is possible to secure its adoption. I am sending to the physicians of the city a circular letter on the subject, inclosing a copy of your letter to me.

Respectfully,

A. H. BROWN,
Health Officer

ALBANY, N. Y., *August* 2, 1907.

DR. A. H. BROWN, *Health Officer, Auburn, N. Y.*

DEAR SIR: — I felt sure of your ready co-operation in the matter of immunization.

The radical mistake of the public so far as it knows, and of most health officers is that the State use of antitoxin is for a charitable purpose. It is so incidentally, but the primary object is sanitary. What you and I want mostly is not to be kind to the patient of the attending physician, but to cut short that epidemic with the very first case. With this view the way to waste antitoxin is to withhold it, to give too small a dose on the start,

to overlook in immunizing, one or two inmates, or servants, or neighbors' servants, or the butcher's boy. This is the gospel we must preach continually — not long I hope as one crying in the wilderness.

Very respectfully,

EUGENE H. PORTER,
Commissioner of Health

The following is a report of a death as the result of an injection of antitoxin prescribed for the treatment of asthma.

BUFFALO, N. Y., *December* 18, 1907.

EUGENE H. PORTER, M.D., *State Commissioner of Health, Albany, N. Y.*

MY DEAR DOCTOR: — I beg to report that in response to your letter of the 13th inst. I went to Cuba, N. Y., yesterday to investigate and report facts in connection with the death of Emory J. Benjamin, alleged to have died November 8, 1907, of "shock from 2,000 units of antitoxin."

I found that Dr. William Litchfield, former health officer of Cuba, has left Cuba to settle somewhere in the west permanently and that Dr. H. G. Gillette of Cuba has been appointed health officer to succeed Dr. Litchfield. He knew all about the case as he was the physician who attended Mr. Benjamin and who administered to him the antitoxin which according to the report of Dr. W. O. Congdon, coroner, made to the town clerk of Cuba, resulted in the death of said Benjamin.

It appears Mr. Benjamin was a man fifty-two years of age who had suffered severely at times from spasmodic asthma since he was twelve years of age. It also appears that Dr. Gillette was a sufferer from asthma and that he had used antitoxin on himself for the relief of the trouble, with, as he states, decidedly beneficial results.

In the course of their business as examiner and agent for a life insurance company, respectively, Dr. Gillette discovered that Mr. Benjamin was suffering from asthma and advised him to try

he injection of antitoxin for its relief. At the time of treatment Mr. Benjamin said he was feeling unusually well and consented to let Dr. Gillette try it. The preparation used was Mulford's, two packages of 1,000 units each being the amount given, ne dose following the other immediately. Dr. Gillette states hat every precaution was used to make the operation aseptic. It as injected under the tip of the left scapula, slowly and carefully, and all air carefully excluded from the injection apparatus. The antitoxin was from a supply due to be returned December 1, 1907, and was used November 8, 1907. On October 9, 1907, Dr. Gillette had some of the same lot used on himself with good results and no bad consequences.

After the first injection Mr. Benjamin complained of a prickly nsation in the pectoral muscles and at the back of the neck. fter the second injection he said it was difficult for him to reathe, leaned forward, had a convulsive spasm, and fell to the oor dead. Dr. Gillette states that the interval from the time of rst injection to time of death was not more than five minutes. leans of resuscitation were at once applied but with negative sults. The case was then turned over to Dr. Congdon, the oroner, for inquest.

Dr. Congdon notified the Mulford Company of the apparent ause of death and they sent their Pathologist, Dr. Stewart, to uba to witness the autopsy which was made by Dr. F. C. oward of Friendship, N. Y. The autopsy revealed no pathological conditions which could account for the death. The heart nd lungs were free from disease, as were the liver and spleen. The left kidney was very small, weight — 2 ounces. The right kidney large, weight,— 10 ounces. Cranium was opened and brain examined for evidences of apoplexy or effusion, but with a negative result.

Dr. Congdon informed me that he had sent the kidneys, spleen, and a portion of the lungs to Dr. Henry Adsit, of Hornell, for a more minute examination, but that he had not received any report from Dr. Adsit in the matter up to date.

Dr. Gillette informed me that he had sent a report of the case to the *Journal of the American Medical Association,* which he thinks will appear in that Journal at an early date. Dr. Gillette

also informed me that a death at Hornell, N. Y., had recently o curred after an injection of antitoxin, but did not remember t name of the physician in whose practice it took place.

Trusting this report may prove satisfactory, I am,

Very truly yours,

EDWARD CLARK, M. D.

SCARLET FEVER

Epidemics of scarlet fever were investigated during 1907 Hartford, Palmyra and Throop.

The epidemic at Palmyra was due to milk infection. T following is the correspondence.

PALMYRA, N. Y., *November* 26, 1907.

EUGENE H. PORTER, M.D., *State Commissioner of Hea Albany, N. Y.*

DEAR DOCTOR: — Our village is again afflicted with an o break of scarlet fever, there being five cases which ha come down within the last three days, and we a somewhat at a loss as to what course to pursue re tive to controlling what we believe to be the cause there During the summer and early fall months when the outbreak fi appeared, upon investigation we found that the cases all emanat from a certain milkman's route. I had the milkman call at t office and thoroughly examined him, and I found evidences desquamation at that time. Then the local board passed a re lution prohibiting him from delivering milk within the confi of the village or town of Palmyra until such time as we believ him no longer a menace to the public, which was six weeks fr the time that he had what we believed to have been scarlet fev and which was so reported to the Macedon Health Board, which town he lives, as being a suspicious case of scarlet fev The Health Board of Macedon replied that they did not quara tine suspicious cases of scarlet fever, and subsequently the ph sician in attendance pronounced it a case of German measl Prior to the time that the proprietor of the milk wagon ca

down with the disease, he had a boy with him delivering milk and said boy was reported by another physician as having had scarlet fever. He was stopped in the street, taken off the wagon and examined, and his hands were found then to be peeling, and he was distributing milk. This, with the evidence of desquamation found by myself on the milkman, was pretty good proof to the local health board that he was suffering from a mild attack of scarlet fever. We thereupon requested him to keep off the wagon until the ordinary time had elapsed, and to have his house, clothing, and everything thoroughly fumigated by the Health Officer of the Town of Macedon, and to present to the local board of health a certificate from his health board, stating that he was no longer a menace to the patrons of his milk route and to the inhabitants of the village and town of Palmyra. This he complied with and now there is another outbreak, and as nearly as we can find out the fumigating at that time was not nearly as effective as it should have been in our opinion. Therefore, we would be pleased to have you send down a representative of the State Board of Health to investigate and ascertain the cause of this outbreak, and the effectiveness of the fumigation of the premises of the milkman at said time. We would like a report of said investigation as the people of Palmyra do not feel that they can stand the expense and inconvenience that this disease is causing them, to say nothing of the fatality that may result therefrom. All of the new cases are also on the same milkman's route, there not being another case within the village or town. There have been no cases that propagated from the school and they are all traceable directly to this one source.

This morning, I endeavored to get you on the telephone, but you were out of town, but I hope that upon your return you will give this matter your prompt attention and let me know at the earliest possible moment when you can give the matter your official consideration, which I trust will be at once.

Awaiting your pleasure in the matter, I am,

Very truly yours,

W. J. HENNESSY.

that.

During the period from September 24 to September 28th a boy by name of Behring drove McCarley's wagon and delivered milk. According to Dr. L. H. Smith of Palmyra, this Behring boy had scarlet fever before McCarley was taken sick. He says he attended him from August 19th to August 24th for scarlet fever and he says he was later informed by the Behring boy that

the whole Behring family had been sick. On August 26th, Dr. Smith of Palmyra and Dr. Reeves, Health Officer of the town of Macedon went to visit the Behring family, who reside in the town of Macedon, and found the mother and three children desquamating and they pronounced the cases scarlet fever and quarantined them accordingly. At this very time one of the Behring boys was driving McCauley's milk wagon in company with Mr. McCauley. On August 26th the boy was examined, while delivering milk, by Dr. Hennessy and he found him desquamating from scarlet fever. Dr. Hennessy ordered him off the wagon and told him he must not deliver any more milk.

After Dr. Chase had told McCauley that he thought he had German measles, Dr. Hennessy examined him at his office on September 22d and found him desquamating. He told McCauley that he was positive that he had scarlet fever. He ordered him off the wagon and ordered him not to come into Palmyra to deliver any more milk until everything in and about his dairy had been thoroughly disinfected and fumigated, and that a clean bill of health must be given him by the health officer of the town of Macedon, showing that everything in and about his dairy and house had been properly disinfected and fumigated, and that in his opinion there was no longer any danger of infection from this source. Except for one day following, when he was on the wagon to show the new driver where the customers lived, he did not come into Palmyra again to deliver milk until October 9, '07, when he brought his certificate from the health officer of Macedon that everything suggested by Dr. Hennessy had been done in the way of disinfection and fumigation.

On September 23d Dr. Hennessy went to McCauley's place and personally fumigated and disinfected the milk wagon and its contents. On this day he found Mr. McCauley engaged in helping to fill a silo, the ensilage from which silo is now being fed to the cattle that produce the milk which McCauley handles.

Dr. Hennessy seemed quite positive that none of these cases resulted from any exposure in school. In two of these cases he is pretty certain that the exposure took place by the children of one family mingling with the children of an affected family while the cases were in the state of inception.

I am convinced that Dr. Hennessy has a very intelligent and comprehensive grasp of the situation and is discharging his duties as health officer in a very effective manner. The other members of the board of health of Palmyra are also rendering him intelligent and effective co-operation.

In view of the facts set forth in this communication, I am compelled to share the belief held by Dr. Hennessy that all of the cases above referred to are the result of an infected milk supply coming from Mr. McCauley's dairy; and notwithstanding the efforts that have been made both by Dr. Hennessy and by Dr. Reeves of Macedon in the way of disinfection and fumigation, I still believe that the source of infection has not been obliterated.

In company with Mr. Hargood, President of the Board of Health of Palmyra, Mr. Tinkelbaugh, another member, and Dr. Hennessy, I visited the several farms from which Mr. McCauley obtains his milk in order to satisfy myself that no sickness of a contagious nature existed in the families of the different farmers or their hired help. In every case we found no evidence of any sickness of any kind, either present or as having occurred in the last few months. A personal examination of the different persons who did the milking on these different farms revealed no evidence of disease of any kind. We also visited the McCauley family and found no sickness there of any kind at the present time.

In company with Dr. Hennessy, I visited one house and saw two of the cases under quarantine in order to satisfy myself that they were indeed suffering from scarlet fever. The case which I examined was found in the active stage of desquamation, so there is no doubt of the type of disease from which the community is suffering.

What seems to perplex the situation so far as any prohibitory action on the part of the Board of Health of Palmyra in excluding McCauley's milk from the village is the fact that McCauley has the certificate of the Health Officer of Macedon showing that in his opinion there is no longer any danger of infection from Mr. McCauley's dairy.

In view of all the circumstances in the case, I am firmly inclined to believe that if the milk from McCauley's dairy was

prohibited from being delivered in Palmyra for a time, and if the same effective and rigorous quarantine is kept up which is now maintained by Dr. Hennessy in the cases now under observation, that there would be a rapid cessation of the trouble.

Hoping this report may prove satisfactory, I am,

Very truly yours,

EDWARD CLARK, M.D.

PALMYRA, N. Y., *November* 29, 1907.

DR. E. H. PORTER, *Commissioner, State Department of Health, Albany, N. Y.*

DEAR DOCTOR: — Yesterday I received a call from Dr. Clark of Buffalo, whom you delegated to come down and investigate the possible contagion of the scarlet fever epidemic at this place. Will say that I was very much pleased with the doctor's manner of handling the case and I think that we have arrived at the proper source of infection, his idea coinciding with mine, but our local board of health at this point wish some backing, or authority, from the State Board in dealing with the matter so far as suppressing what we believe to be the cause. Just where this infection comes from, of course, we are unable to determine, but there is no question but that there was a person, or persons, delivering milk during the last of August and the first of September, who had scarlet fever. Whether it is possible for the utensils to be carrying the infection all of this time or not, especially after the owners thereof allege that they have carried out my instructions in every particular. Our local board of health desires to avoid the lawsuit which will probably be brought, should we prohibit the party from bringing milk into the town of Palmyra, he living in the adjacent town of Macedon.

We would like the advice of your legal advisor, if you have one connected with your office, as well as your advice as to what course to take in order to stop the spreading of the disease. For your information, I would say that there have no cases arisen ex-

cepting on this one milk route. There has been no outbreak in the school since early in the school year, and it is my earnest desire to prevent such an outbreak, and to get the thing completely stamped out if it is possible.

I trust that you will give me the information as how best to proceed from a legal standpoint at your earliest convenience.

Very truly yours,

W. J. HENNESSY,
Health Officer

ALBANY, N. Y., *December* 5, 1907.

DR. W. J. HENNESSY, *Health Officer, Palmyra, N. Y.*

DEAR DOCTOR: — Replying to yours of November 29th, after carefully reviewing the circumstances in the epidemic of scarlet fever in your town, it is quite evident that the disease was caused by the milk supply, and that the boy Behring, and the dealer William McCauley after him were the cause of contagion. The latter was known by a competent observer to be desquamating September 22d; his illness dated from September 2d, and his return to his route was October 9th. A period of five weeks and two days from the time of the first physician's visit, a period quite too short to ensure safety considering the important interests. . . .

Your duty is to prohibit him from selling milk for a time, and in the meantime to require a redisinfection of his containers, premises, etc., and a re-examination of both McCauley and the boy Behring, not only as to desquamation, but the condition of the hair as to dandruff, and the throat and nasal cavity for mucous discharges; also the clothing, gloves, etc.

With the facts pointing to this course as the right one so persistently, you are hardly warranted in putting the lives of the children of Palmyra on one side of the scale and the risk of law suit for the municipality on the other.

My deputy, Mr. Seymour, who is a lawyer, and of much experience in such cases, is quite certain that you would be quite safe in taking this action and that a jury would not find against you. He recommends that your authorities hereafter require all

rom milk venders, revocable upon the recommendation of
lth board, and that you use this to hold over McCauley.
asy to see now that you erred in allowing him to return
t making your own inspection of all conditions of the
n. A provision of that nature might well be put in your

It would, in fact, be a good time to make regulations
ng the production and distribution of milk. Many towns
v doing that. I would be glad to send you those of South-
, Long Island, for a model if you cared for the same.
ay say that the verdict of our expert Dr. Edward Clark,
very careful investigation, is that all your scarlet fever
result of an infected milk supply coming from Mr. Mc-
's dairy, and that the source of the infection has not been
ated.

Very respectfully,

EUGENE H. PORTER,
Commissioner of Health

following rules and regulations regarding the production
le of milk were adopted by the town of Southampton,
county.

Milk and Its Production

nilk shall hereafter be produced, sold, exposed for sale or
ed within the town of Southampton unless it is produced
ndled in accordance with the requirements of this article.
person shall hereafter engage in the sale or exposure for
milk within the town of Southampton without first having
ith the registrar a true and complete statement of the
from which all the milk they handle is produced, a com-
st of the persons from whom the said milk is purchased,
omplete list of the localities from which ice is obtained for
purposes; and if at any time the place at which said milk
uced or the persons from whom the said milk is purchased
ocality from which said ice is obtained be changed, the said
shall be notified immediately. On or before the 15th
June and of December of each year, and at any other time
three days of the receipt of a request therefor, any person

engaged in the sale of milk in Southampton shall furnish said board with a complete list of all persons to whom milk is regularly sold.

Rules and Regulations

The room in which the cows are kept shall contain at least 500 cubic feet for each cow housed therein; shall be well ventilated and lighted; have a dry, well-drained floor, and be well cleaned each day, the manure being removed at least twenty feet from the barn at each cleaning.

The ceiling and side walls shall be whitewashed at least once during the fall of each year and be kept free from dust, cobwebs and filth at all times.

No swine shall be kept in the same room with the cows.

No musty or dirty litter shall be used for bedding.

The food and water given the cows shall be at all times pure and wholesome.

All cows shall be free from stable filth and loose dust.

The milkers shall have clean hands and clothing at the time of milking. Any milker or other employee having any acute or chronic disease shall not be allowed to milk the cows until he is provided with a certificate from a doctor.

Milk shall be removed immediately after being drawn from each cow to a well-ventilated milkroom, separate from the stable-room and there aerated and cooled before being placed in the cans.

Milk must be strained through a cotton flannel or other equally efficient strainer, which shall be renewed as often as necessary to be efficient. All strainers must be cleaned and sterilized after each milking.

All vessels having contained milk shall be washed clean and sterilized after each milking or using.

Milk delivered in bottles shall be bottled in the milkroom. at the dairy or creamery, and bottles shall be cleaned and sterilized at the dairy or creamery even though having been washed by the customers.

No milk vessels, tickets or other thing shall be taken from house while it is under quarantine for a contagious disease.

No milk tickets shall be used by customers more than once.

All wagons, sleighs or other vehicles from which milk is de

shall be kept clean in a manner satisfactory to the Board
uthorized agent.
ry person or corporation, whomsoever, who shall at any
ereafter sell or deliver milk or cream within the town of
mpton, shall, when requested so to do, by this Board or
horized agent, permit any and all cows and herds from
the milk or cream shall be obtained and the premises on
they may be kept, to be examined by any member of this
or its authorized agent and shall at any time, upon request
ı authorized agent of this Board, furnish samples of such
r cream to him for analysis and test.
m.—No cream shall be sold, exposed for sale or delivered
the town of Southampton unless it be produced and
d in accordance with the requirements hereinbefore set
or the production and handling of milk.
person violating any of the provisions of this article shall,
onviction thereof, forfeit and pay a penalty of twenty-five
for each offense.
license herein provided shall be in writing and shall con-
n force until the first day of ..... following the
f its issue. It shall not be sold or transferred without the
ı consent of the Clerk of this Board. The fee for said
shall be fixed at one dollar.

MEASLES

sles have been very general and of unusual epidemic severity
ıy localities throughout the State. The Department still
ıes to hold to the policy of subjecting measles to quarantine
)lation wherever this can be practically carried into effect.
btedly in some localities an efficient quarantine at the out-
ght control an epidemic, but in many instances that have
o the notice of the Department it was evident that the
ic had gotten such headway that sanitary control by the
uthorities was impossible.

TYPHOID FEVER

lemics of typhoid fever were investigated during 1907 at
ield, Whitehall, Palmyra, Katonah, Willsboro, Catskill,

St. Johnsville, Center Valley, Ticonderoga, Boonville, Rensselaer, Cape Vincent, Castleton, Dobbs Ferry and Hastings.

The following investigation of the increase of typhoid at Katonah, in connection with a similar increase in New York city, and the possible relation between the two was made by Dr. H. D. Pease, director of the Hygienic Laboratory, and Mr. Theodore Horton, chief engineer of the Department.

KATONAH, N. Y., *March* 11, 1907.

State Department of Health:

I enclose another card of case of typhoid in the village of Katonah, making the third case in less than a month.

I am having the water supply, also the milk, analyzed bacteriologically, in hopes of finding some clue to the source of infection.

Any suggestions from the State Department I shall be glad to entertain.

Very respectfully,

W. J. CARPENTER,
Health Officer

ALBANY, N. Y., *March* 14, 1907.

DR. EUGENE H. PORTER, *State Commissioner of Health, Albany, N. Y.*

DEAR SIR: — In response to your request for an investigation of the outbreak of typhoid fever at Katonah, N. Y., I desire to report that Mr. L. M. Wachter, Sanitary Chemist in this Laboratory, was sent at once to Katonah, and upon his return to-day gives me the following information, much of which he obtained from the health officer, Dr. Carpenter.

There exist four cases of typhoid fever in the village of Katonah. The first case is in a man, an itinerant painter, who might have contracted the disease in any one of several places or way. The other three cases are in school children attending the same school, and who presumably drank water from a spring near the schoolhouse.

It appears that last fall several barrels of human excreta from a hotel were dumped on the surface of the ground which sloped toward an open ditch, which in turn passes by the school within five or six feet of the spring.

Examination of the water of the spring after the development of the disease in the school children, did not reveal any evidences of its pollution, but it is, of course, possible that pollution had existed and had ceased.

If no other cases develop in those who have not used this spring water, the available evidence will point toward this spring as the source of the typhoid fever for the reasons given, and also because the water supply of the village of Katonah has been tested on many occasions by the Mount Kisco Laboratory of the New York City Water Department and found to be an exceptionally good supply. Likewise, also, Dr. Carpenter has entirely failed in his efforts to trace the source of the disease to possible infected milk, oysters, vegetables, etc.

There is no sewerage system in Katonah, and the sewage is emptied into cesspools which should operate satisfactorily at present, as the entire village is newly built and the soil is favorable for handling sewage in this way.

Cesspools into which the discharges from two of the cases of typhoid fever are dumped, after disinfection with chloride of lime, are about seventy-five feet away from the Katonah creek which finds its way into the water supply of New York city. However, these cases are cared for by trained nurses, and the disinfection of the discharges and the care of the patients are properly attended to.

Dr. Carpenter has posted a notice prohibiting the use of the schoolhouse spring water. He also states that he will keep the Department informed of any new developments in the situation.

Yours very truly,

H. D. PEASE, M.D.,
Director State Hygienic Laboratory

ALBANY, N. Y., *April 7*, 1907.

EUGENE H. PORTER, M.D., *State Commissioner of Health, Albany, N. Y.*

DEAR SIR: — I have the honor to report the results of an investigation made by me yesterday of the occurrence of typhoid fever at Katonah, N. Y., and also of the considerable increase in typhoid fever in New York city.

Since my report of March 14th, on the typhoid fever situation at Katonah, which was investigated by Mr. Wachter, sanitary chemist, in which report the causation of the disease was in large part attributed to the contamination of a spring near a schoolhouse in that village, other cases of the disease have been reported to the Department by Dr. Carpenter, the health officer, as follows:

Mrs. Herbert S. Chapman, ill on March 6.
Robert Hoyt, ill on March 10.
Mrs. George A. Scofield, ill on March 12.
Arthur Clark, ill on March 23.

In none of these cases could the infection be attributed to the use of the water from the spring. Some of these cases live, however, on the banks of a tributary to one of the New York city water supplies.

The weekly report of the New York city health department for March 23, having shown a very considerable and unusual increase in typhoid fever cases for this season of the year, it appeared to Mr. Seymour and myself that an immediate reinvestigation of the Katonah situation should be made.

I therefore came to New York and put myself in touch with the Health Commissioner, Dr. Darlington, who had already planned to personally investigate the whole situation. We went by automobile to Mt. Kisco. There we were joined by Mr. D. D. Jackson, Sanitary Biologist of the Department of Water, Gas and Electricity, and inspected the conditions in various portions of that village. Concerning these conditions in the village of Mt. Kisco, I desire to comment as follows:

In the rear of the block at Main and Hyatt streets, known as the Gorham property, there existed a very evidently serious con-

dition for the water supply and indeed a condition constituting a nuisance to the neighborhood in that a pile of ashes and garbage ten feet in diameter was present and the latter elements would soon undergo decomposition. Several privies are here, within a few feet of the tributary, which runs to Croton lake, and while the water department authorities of the city of New York have changed all such into open pan closets and attend regularly to the cleaning of them, the location of them and their character is such that should a case of typhoid fever occur in this block nothing short of ideal care of the case would prevent the contamination of this stream. The conditions here, however, are infinitely better than in the lower western section of the village, near the railroad tracks, where a very considerable area of ashes and garbage dumping ground, shanties with open privies, and all railroad track drainage passes into a small stream which eventually passes into the New York city supply.

These conditions are intolerable and should be remedied at once on the ground that they constitute a nuisance to the village inhabitants.

The cause of the blocking of the agreement between the New York city and the Mt. Kisco authorities as to the sewerage system of the latter is well known to you. But in addition to this hindrance to the correction of these conditions, is the blocking of the New York city authorities in their work of correcting conditions by the purchase of contaminating property by the stipulations of (Chapter 738, Laws 1905), which prohibits such purchases. It will probably be impossible for the city of New York to prevent the entrance of contaminating materials into the tributaries of the Croton lake supply unless it has the right of purchase of sanitarily dangerous properties on the banks of these small streams.

Mr. Jackson informed me that constant supervision and examination of these streams is being conducted by his Department. Lack of time prevented my calling upon Dr. Curry, the health officer.

Complaint was made by Dr. Darlington to me that the sewage disposal system of the Montefiore Home for Consumptives at Bedford had been for several years past a source of great concern

to the health and water departments of the city of New York. The system as I found it yesterday is as follows:

A buried septic tank located upon the eastern slope of the hill upon which the institution stands and the drainage from which leads into a direct tributary to Croton lake, was exposed at one corner and a bad leak had evidently been recently repaired at this point. The surrounding soil for some distance had been washed away. Moreover there were evidences that at times the tank overflowed. From this tank a pipe conducts the septic sewage to two square concrete aerating basins which in turn empty into two ditches about 10 feet wide by 100 yards long. Here the sewage remains until evaporation or seepage disposes of it.

These ditches are located on the same side of the hillside as the septic tank and directly above the small stream tributary to Croton lake. In order to protect this stream numerous smaller ditches have been dug between the sewage containing ditches and the water supply and in the case of the overflow of these main ditches the smaller ones may prevent the sewage from reaching the tributary.

These ditches can only be considered as temporary affairs and the clay-containing character of the soil renders their action most uncertain. The institution has had numerous plans for a proper system drawn up but nothing has ever been done. I would recommend that a letter be written to Mr. Julius Robertson, 37 Spruce street, New York, chairman of the committee institution trustee having the matter in charge notifying him that the plans decided upon must be approved by you and that the nuisance now being created by them (Montifiore House) should be remedied once.

We next proceeded to Katonah and endeavored to see the health officer, Dr. Carpenter, but he was not at home. We inspected the schoolhouse spring and found the conditions as described my previous report.

We met here Dr. Charles A. Bolduan of the New York city health department laboratory service, who has been on the ground for several days studying the situation.

He informed us that a number of children attending the school in question and among whose scholars cases of typhoid fever ha-

been found, had likewise been sick and at home for periods of a few to ten days about the time the other children were ill with typhoid. He is not able to state at present whether these were mild cases of typhoid fever or not.

It appears however that by patient search by both Dr. Bolduan and Mr. Jackson all of the persons having typhoid probably obtained milk from a dealer named Truesdale and that a relative of his died some week or so before the outbreak from some condition which the investigators believe was typhoid fever. It is claimed that this man did not visit the Truesdale dairy. The examination of the milk from this dairy indicates that it is not produced under ideal conditions.

Both Dr. Bolduan and Mr. Jackson have promised to send their completed reports to me as soon as ready.

The situation could not be better handled than by these trained investigators who are co-operating with Dr. Carpenter. Mr. Jackson believes the cesspools receiving typhoid discharges and located near the tributary to the New York water supply at Katonah are probably not a serious menace to that supply.

It appears that northerly of Katonah a contractor is operating gangs of foreign laborers directly on the watershed and the charge was made in the press that the conditions were thoroughly bad.

Dr. Darlington informed me that these conditions had been corrected and that the laborers were located on ground owned by the city of New York and that he could compel the adoption of proper rules. I did not inspect the location.

It appears from information furnished me that most of the typhoid fever cases in New York city have occurred north of Central Park and while this region receives the water from the Croton supply before the lower sections of the city the fact remains that other sections receive the same water and are not suffering from the disease to an unusual extent. The determination of the cause of the increase in the disease will require the further investigations which the city departments are conducting.

Yours very truly,

H. D. PEASE, M. D.
Director State Hygienic Laboratory

KATONAH, N. Y., *April* 19, 1907.

E. H. PORTER, M. D., *State Commissioner of Health, Albany, N. Y.:*

DEAR DOCTOR: — I beg to submit the following report of our typhoid epidemic at Katonah. I shall include with the reported cases four cases that were not reported, and at the time were not considered even suspicious. Two of these cases died and were reported as pneumonia, but from the fact that they lived two weeks makes it seem quite probable that they were typhoid cases. The other two cases at the time were not considered to be even suspicious but since their convalescence they show the Widal reaction.

The cases were apparently in groups. The 1st of February we had three cases, one of these died about February 14th and was one of the suspected cases as referred to above. Between February 25th and March 1st there were seven cases reported. One of this group died after two weeks' illness and was reported as pneumonia. One other case not reported gives the Widal reaction as late as April 10th. Between March 9th and 16th three more cases developed, one of which proved fatal. Since March 16th we have had no new cases.

The source of the infection was not easy to locate, but *all* the cases used the village water and no cases developed where the village water was *not* used. This fact, to say the least, was suspicious.

The village water supply is pumped from a well dug in sand and gravel about 200 feet from the Beaver Dam brook (a tributary of the Cross river into which it empties 1,000 feet below), from the brook to the well a six-inch iron pipe had been laid for use in case of fire, when this could be opened and both engines used. On making careful inquiry we found that the man who did the pumping acknowledged that he had the gates to this pipe open a number of times during the winter "to *test the pipe*" (?) however, we believe the gates were opened that he might fill the tank the more quickly.

During the past year there have been three cases of typhoid at the camp located where the Cross river dam is in progress of building; two of these cases were Italian laborers. Italian laborers have been working on a sand pit near the Beaver Dam brook

just above where the pipe from the well takes its water from the Beaver Dam brook, and the common report is that these laborers were not at all particular where their excretions were deposited. This without much doubt was the source of the typhoid infection. I wish to acknowledge the help that I have had in tracing the source of this infection from the New York city board of health through their doctor, Dr. Bolduan.

To-day there is no more sickness in Katonah than could be expected at any time.

Very respectfully,

W. J. CARPENTER,
Health Officer

ALBANY, N. Y., *April* 22, 1907.

EUGENE H. PORTER, M.D., *State Commissioner of Health, Albany, N. Y.*

DEAR SIR: — I beg to say that, in accordance with your request, I have visited New York city and Katonah, and conferred with the officials of the New York Health Department, and the Department of Water Supply, Gas and Electricity, in the matter of the recent increased amount of typhoid fever in New York city and its possible relation to typhoid fever in Katonah; also in the matter of investigating specific alleged cases of violations of water rules for the protection of the Croton supply with a view to taking summary action to remove them.

On April 17th, I met Dr. Darlington in New York and with him visited Katonah where we were met by Dr. Bolduan of the City Health Department and Mr. Sawin of the Department of Water Supply, Gas and Electricity, and Mr. Vogt, Inspector of the State Department of Health. In the afternoon we visited various places of pollution where there were alleged nuisances or violations of water rules in Katonah, Bedford and Mt. Kisco. We also inspected the condition of labor colonies at the Cross river dam and at the slate road work near Mt. Kisco. Dr. Darlington and I also visited and inspected the sewage disposal works of the Montefiore Home. In the evening I called on Dr. Car

penter and discussed the question of pollution of Croton su and the sanitary conditions relative to the Muscoot dam.

On April 18th, with Dr. Bolduan and Inspector Vogt, I vi Brewster and inspected other cases of pollution of the C watershed and inspected the sewage disposal works of Brew now being operated by the Water Department. I left Mr. at Brewster with directions to review and record in full all of alleged pollution at Brewster and later to do the san Mt. Kisco and Bedford, co-operating with Mr. Sawin and Bolduan in this work. I directed him to forward a list t Department with all the information necessary for the D ment to issue notices with respect to their removal. Det instructions were given him as to the data and records to b lected. Dr. Bolduan had to leave the work this day, not t turn until April 20, but I arranged a continuation of this i tion work with Mr. Sawin.

In the afternoon, I arranged a conference with Mr. I Jackson, Chief Chemist, Mt. Prospect Laboratory, to revie typhoid situation and arrange for a more extensive examin of watershed, and to devise certain improvements which mig desirable to further protect the water supply.

After the cursory inspection made by me as above outlined after conference with Dr. Darlington and Dr. Jackson, I come to the following general conclusion as to the typhoid in New York and Katonah, and of the steps that migh should be taken toward the further protection of the C supply.

In regard to the reported typhoid fever cases at Katona

1. A few of the cases which have occurred were very po and even probably caused by infected spring water.

2. A few other cases were due in all probability to general causes such as infected milk. Very few, if any, wer to secondary infection.

3. Two or three cases may be considered doubtful as to nosis since they were not tested by Widal or Diazo tests.

4. That there is very slight evidence that the public supply of Katonah has received sufficient pollution, or at

any infection, that would account for the cases of typhoid fever that have occurred.

In regard to the typhoid fever in New York, which has risen to a maximum of nearly double the normal for this season, in the latter part of March, and is now declining to nearly the normal, I would say:

1. That there were found very few, if any, evidences of direct fecal pollution of Croton lake, Croton river or tributaries shown to me during my inspection, although there were numerous cases of either indirect pollution or the pollution by wash or slop water shown to me. There may have been times during the recent period of melting snow and ice when fecal pollution may have reached Croton lake or its tributaries.

2. That with the typhoid cases reported in Katonah, there was apparently, and according to information furnished me, considerably more than the ordinary care taken to prevent any infection from reaching Croton lake.

3. That there were possibly other cases of typhoid on the watershed that were not reported. A complete survey of the watershed has not up to this time been made.

4. That notwithstanding the care taken to prevent any transmission of infection from Katonah cases to the Croton lake, the fact remains that with the present stage of water level in Croton lake, there is a comparatively short period of storage, and that typhoid fever in New York reached a maximum within a time subsequent to outbreak at Katonah. It is, therefore, possible, if not probable, that infection of the water supply may have been directly due to the Katonah cases and may have been the cause of the rise in typhoid fever in New York city.

5. The period of recent maximum typhoid fever in New York is coincident with a noticeable general high typhoid fever in other portions of the State. It may be possible that the early freshet of this year may have had a direct influence upon the typhoid fever by washing infection into all portions of the Croton lake or it may have had an indirect influence through contamination of milk shipped into Manhattan from various parts of the State.

6. That, according to Dr. Darlington, the milk supply in Ma hattan, when the high typhoid is referred to, is not very differe from that in other parts of the city. This would again indicate suspicion that the water supply from the Croton, which suppli almost exclusively this section of New York, may have been t cause of the recent undue prevalence of typhoid fever, inste of the milk supply.

In view of the foregoing, there is good evidence to indica that the high typhoid fever in New York is due in part to t water supply taken from Croton watershed and that this supp was infected by typhoid fever patients at Katonah or oth causes not yet discovered. Although there is no direct eviden that milk may be the cause of a part of the increased typhoid New York, I believe there is a strong possibility that this is n only an important factor in the general typhoid of New Yo but it may be a factor in the recent increase of this disease the city.

Whether or not the cases of typhoid fever at Katonah or t milk supply at New York city were the real causes of the i creased amount of this disease in the city, the fact remains th there were discovered on the watershed of the Croton lake, ma cases of direct or indirect pollution which constitute either nu ances or violations to the water rules enacted by the State I partment of Health in 1889. These cases of pollution constitu a menace to the purity of the New York water supply so lo as they exist. Both the City Department of Health and t Water Supply Commission claim that they are powerless to move this pollution:

1. Because neither the local residents nor the local boa of health seem willing or anxious to act in the matter.

2. Because the city has no authority or jurisdiction in t watershed to enforce the water rules prepared by the St Board of Health.

3. Because the City Comptroller will not allow purch of additional land on the watershed to remove these caus

4. Because the city will not construct sewer systems a disposal plants to prevent the pollution.

5. Because, as they allege, the State Board of Health in former years has not acted upon nor prosecuted cases called to their attention by the Water Department.

Although I was not shown many cases of pollution which were serious enough to constitute nuisances, I was, as stated above, shown a large number of violations of water rules, and I am of the opinion that these should be removed. A list of these is now being prepared by the representatives of the three Departments now working in co-operation upon the watershed. In order to avoid any delay, I requested that a partial list of the more important violations be sent in at once so that action could be taken in regard to them in accordance with the procedure outlined under sections 70 and 71 of chapter 661 of the Laws of 1893. If summary action can be taken now with a few of the flagrant cases of violation, I believe that the remainder of these cases can be removed with little or no difficulty.

Attention should be called to the growing population upon the watershed of the Croton lake and river, and to the corresponding growing danger of not only direct infection of the New York water supply but to the indirect or accidental pollution which always results from a population resident upon a watershed. This danger can be reduced to the lowest point that is practicable, but there will always remain some pollution, and possibly infection, from indirect surface pollution and from accidental causes. This cannot be too strongly impressed upon the New York officials, when we consider the recent discoveries and present experience of the New York Department of Health, where certain persons under unusual physical conditions were found to be normally well, but carried in their intestines and disseminated through the community a large number of germs of typhoid fever.

New York city will not be thoroughly protected against these growing dangers of infection upon the Croton watershed until the Croton supply is filtered. This, I believe, is so well known by the citizens and city officials of New York city as to hardly merit more than allusion to it by me at this time. In fact it is to be hoped that with the recent practical experiment of relying upon natural purifying agencies on a watershed having a

rapidly growing population residing upon or near the shores of its reservoirs and feeders, for protection against typhoid fever infection, the city of New York will now act at once in this matter. The people of New York need this protection and should have it without delay.

Very respectfully yours,

THEODORE HORTON,
Consulting Engineer

CEREBRO-SPINAL MENINGITIS

The return of only 159 cases of cerebro-spinal meningitis for the year indicates that this disease has rapidly subsided since last year.

SMALLPOX

The epidemic of smallpox which since the Cuban war has prevailed in various portions of the United States every year, was during 1907 more prevalent than in any previous year. The type of the disease remains unchanged.

Dr. F. C. Curtis, whose observations in this peculiar epidemic have been very extensive, says that the type of the disease as it appears along the Hudson river, having been brought there by negroes from the south, is more typical than that which has appeared in the northern counties of the State, and which has reached us from the Canadian peasantry. The former goes further toward pustulation than does the latter, although as a rule everywhere the disease is disposed to abort as soon as the eruption appears. The characterization of this epidemic by Chamberg, that it constitutes, by reason of its unprecedented mildness, "a new chapter in the history of the disease," is still justified.

It may be as well said of it that it is without precedent in the difficulties it presents in the matter of sanitary control. Elsewhere is given a list of the places where it has appeared as well as the number of cases reported for each place, but the list gives an inadequate idea of the real extent by reason of the very large number of unreported cases. The failure to report these cases of smallpox, which is made obligatory by law, has been due to

several causes — many have been unrecognized; others have been concealed. In some localities, while the disease has been identified, its significance as a contagious disease of a pestilential nature has been ignored on account of its mildness, and also on account of the frankly acknowledged unwillingness of the community to subject itself to the burdens of quarantine and the personal annoyance connected with vaccination. The result has been that for the latter six months of the year the activities of this division have been taxed to their utmost in an effort to hold the disease in check.

In all previous experience with smallpox dread of disease by reason of its mortality and its loathsomeness has been sufficient sooner or later to impress the public with the importance of energetic efforts for its suppression. At the present time probably a majority of the public are sufficiently intelligent and order-loving to be guided by the judgment and opinion of sanitary authorities, and are ready and have co-operated with health officers and boards by obedience to quarantine and other requirements. But the proportion of people who defy sanitary authority remains very large. It includes too often the medical profession and health officers themselves. The only possible lawful enforcement of vaccination is through the public schools, but until quite lately there has been great difficulty in getting school authorities to enforce the really mandatory provisions made by the Public Health Law for the vaccination of public school children. Years of freedom from smallpox has brought about an established indifference and neglect, so that in many localities probably three-fourths of the population are unvaccinated. It has been a roundabout and ineffective procedure to persuade the local health authorities to compel the local school authorities to enforce the law.

While local health boards are invested by law with very large powers for the public control of contagious disease, local authority is rarely found to rise higher than local public opinion. It is within the province of the State Department to act only in an advisory capacity. It has not the power to enforce laws. Where popular sentiment is hostile, or indifferent, that promptness of

action and energy of a united people which is necessary to control such a disease as smallpox cannot be attained.

Under such adverse conditions the Division has found itself restricted to a campaign of education, and it would make too voluminous a report to give in detail the correspondence of each one of the seventy or more infected localities, and the conditions have been so similar in all that such a repetition would be unnecessary.

Upon receiving notification of a suspected outbreak, the practice has been to send at once a competent expert to determine the diagnosis. In many instances, almost a majority, this has disclosed the fact that the disease has existed for some time unsuspected. The infected families have had an opportunity from personal observation to size it up as an unimportant affair and to spread it freely. Quite commonly it has been mistaken for chickenpox. In small municipalities where local authorities as a rule lack organization, the first duty has been to impress the local board with its own powers and their manner of exercise, and their duty and responsibility under the circumstances. Circulars of instruction as to quarantine, vaccination and disinfection have been forwarded for study and distribution. School vaccination has been insisted upon and by all available powers of persuasion the complaisant community has been aroused to an understanding of the significance of the outbreak. The position of the health officer has been often a trying one, but in the main it has been his influence which finally saved the situation. Some health officers have resigned. Many have found themselves seriously injured in practice in the stubborn contest with the ignorance and prejudice of their own patronage. Too much credit cannot be paid to the loyalty and devotion of these locally unappreciated self-sacrificing public servants.

In the long run the majority of the health officers succeeded not only in stamping out the epidemic, but what is of permanent importance, in securing a general vaccination of their people and the vindication of the compulsory school vaccination law. The indirect value of the experience in putting the local organization in the localities on a more secure footing has been very great.

Conflict Between Compulsory Vaccination Law, and the Compulsory Attendance Law

It will be seen from the following letter from Commissioner of Education Draper that the supposed conflict between these two laws does not as a matter of fact exist.

The reply to Dr. Draper's letter is appended as showing the attitude of the Health Department in view of the unprecedented circumstances of the present epidemic.

ALBANY, N. Y., *December* 5, 1907.

EUGENE H. PORTER, M.D., *State Commissioner of Health, Capitol, Albany N. Y.*

DEAR SIR: — Replying to yours of November 29th, I have this to say: Section 210 of the Public Health Law provides that no child not vaccinated shall be admitted into any public school of the State, and that school officers shall enforce this provision of the law. It also requires trustees or other school officers to make provision for the vaccination of any child of school age whose parents are otherwise unable to procure vaccination.

Since the enactment of the compulsory attendance laws, this Department has uniformly held that when parents refuse to have their children vaccinated and they are excluded from the public schools on that account, the parents must provide private instruction or be held to violate the provisions of the compulsory attendance laws and thereby become subject to prosecution under such laws.

We have recently had many letters from trustees and parents residing in the counties of Jefferson, Lewis, Herkimer and Oneida, making inquiries as to the right of trustees to bar children from attendance upon the public schools when the children are not vaccinated. We have uniformly replied that trustees not only possess such power, but that the law makes it the duty of trustees to exercise it, when the health authorities deem the rigid enforcement of the law necessary to the protection of health. The uniform direction of this Department to local school authorities is that they shall co-operate with the local health authorities.

At the same time, it seems proper for me to suggest that, in

view of the fact that many parents are opposed to vaccinatio
anl in view of the other fact that the purpose of the provisi
which bars unvaccinated children from the schools is to prevent t
spread of contagious disease, your Department should direct loc
health officers to insist upon vaccination only in cases where ther
is some apparent danger of the spread of smallpox.

Very sincerely yours,

ANDREW S. DRAPER,
Commissioner of Education

ALBANY, N. Y., *December* 17, 1907.

DR. A. S. DRAPER, *Commissioner of Education, Capitol, Albany, N. Y.:*

DEAR SIR.— I have yours of December 5th, outlining the attitude of the Education Department as to the enforcement of section 210 of the Public Health Law, and I am gratified to find that it is in substantial accord with the policy of the Health Department.

I notice with interest your suggestion that the law should be enforced only where there is an apparent danger of the spread of smallpox.

Unfortunately, preconception founded on past experience of what constitutes danger of the spread will not serve us in the present emergency. Hitherto we have been able to count on dread of the disease, and the force of public sentiment as inhibitory influence. But the mildness of the epidemic, and a degree of rural ignorance and prejudice rather greater than common among the people of the infected section, has led them to regard the disease with contemptuous unconcern, and to openly revolt against all sanitary measures for its control at home, or to prevent its spread abroad.

I am taking the liberty of sending you an extract from the bulletin for November, which will serve to explain this unprecedented situation, and also a copy of an appeal to local officers to sustain sanitary authority — of which at many points there is a virtual breakdown. I am trying to educate the people aright, but I may need to resort to other expedients. It will not be safe to concede much to a public sentiment of this mood, nor to await

in individual school districts the establishment of smallpox, before enforcing a law made by the State for the State's protection. Generally, in intelligent and orderly communities, I would agree to the unwisdom of enforcing the law too stringently.

Very respectfully,

EUGENE H. PORTER,
Commissioner of Health

Conference at Watertown

In October and November smallpox had become very general in the counties of Jefferson, Lewis and Oneida, and local efforts for its control practically broke down. A conference was therefore called of all the health officers and members of the health boards to meet the Director of the Division of Communicable Diseases, and Doctors Curtis, Clark and Bibbins, Medical Experts of the Department, to discuss the situation and infuse new energy into the contest.

The following call was sent to the health officers of eighty-one municipalities.

ALBANY, N. Y., *November* 16, 1907.

MY DEAR DOCTOR: — There will be a conference of Health Department officials with the health officers and members of local boards of health in Jefferson, Lewis and Oneida counties at Watertown, Wednesday, 2:00 P. M., November 20th, at *The Woodruff House* to discuss the difficulties which you and other health officers are encountering with the management of small-pox epidemics. It is considered of great importance that you attend this meeting, as the State Department considers it necessary to suppress the epidemic and is prepared after proper consideration of the local situation, to render whatever assistance may be necessary. Please bring with you one or more members of your local board, and come prepared to report on the number of children vaccinated and unvaccinated in the schools in your municipality, and what action you or your school board have taken to enforce the vaccination section of the Public Health Law; also to report on the attitude of the public sentiment as to sanitary measures for the control of smallpox.

Do not feel embarrassed in coming to the conference on account of any difficulty you may have experienced in diagnosing smallpox at the beginning of the outbreak. It has been common experience everywhere.

Very respectfully,

EUGENE H. PORTER,
Commissioner of Health

A general response followed the call and sixty out of the eighty health officers met at The Woodruff House on the afternoon of November 20th. The meeting was presided over by Dr. Spencer of Watertown, and was addressed by Dr. Curtis of Albany, Dr. Clark of Utica, and Dr. Wheeler of the Department, after which a general discussion followed in which all participated.

The seriousness of the situation was fully realized and also the need of energetic action to combat it. In general it was shown that the health officers were alive to their duty, but in many instances lacked the support of the board of health and in many more were hampered by the absolute indifference, if not the opposition, of the people generally.

The effect of the conference in stimulating the health officers to renewed action and impressing the public with the importance of the epidemic was soon obvious. As a further means of educating the public, a circular of information was sent out to the various newspapers of northern New York asking their co-operation and support, and also a further circular letter was sent out to the health officers, members of the boards of health of towns and villages and school boards, city councils and school trustees in Jefferson, Lewis and Oneida counties.

ALBANY, N. Y., *December* 7, 1907.

To the Editor:

DEAR SIR: — I am sending you an appeal for your co-operation with me in an effort to educate public opinion as to the real significance of the mild form of smallpox which has prevailed since last June in certain sections of the State and particularly in Oneida, Lewis and Jefferson counties and the surrounding country.

The fact of the mildness of the disease and consequent freedom
om mortality, has led to a popular misapprehension as to its
aracter and an unwillingness on the part of the people to sub-
t themselves to the restrictions upon their liberty necessary to
ng it under control.

As a consequence, the disease not only persists, but during the
ning winter is likely to increase; owing to the neglect of dis-
ection of homes, there will be left behind innumerable foci of
tagion where the disease for an indefinite time is likely to
ak out again. While the nature of smallpox is too little under-
od to make it possible to explain why one epidemic should be
d and the following one a veritable scourge to humanity, ex-
ience teaches that epidemics of widely varying intensity do
low one another with sometimes frightful celerity, and it is al-
ether probable that the smouldering fires of an imperfectly
ppressed mild epidemic do break out in the same locality, under
w and unexplainable conditions, into veritable pestilences.

It should therefore be a matter of serious concern for the in-
bitants of Northern New York themselves to thus ignore the
ture pestilential possibilities of this apparently innocent mal-
y. They are, as it were, banking so many fires that later on
ay burst into devastating conflagrations. They ought, as duti-
l citizens, to subject themselves to quarantine, and to employ
migation and disinfection for the eradication of the contagion,
just the same spirit as they would pay their taxes, or as they
uld submit to any other restriction upon their personal liberty
-for the common good. A rebellion against the wise sanitary
ws of their county, founded as these laws are, on enlightened
perience and intelligent and scientific observation, is just as
isloyal as a rebellion against any other of their county's laws.

The situation would be deplorable enough if the people of
ese counties could fence themselves in and thereby limit the
nsequences of their shortsighted selfishness to themselves. But
ey are instead, knowingly and wilfully carrying the disease to
her parts of the State whose inhabitants rightfully regard small-
x in its true pestilential nature.

There is not a health officer of any considerable town or city
roughout the entire State who is not at the present time watch-

ing with keenest apprehension, the possible advent of some reckless convalescent smallpox carrier from these infected districts. Outbreaks from this source have appeared twice already in Utica, twice in Syracuse, and at least once in a dozen other places. To say nothing of the wrongfulness of such outrages upon innocent communities, the mere labor and expense of stamping out these incipient epidemics is a costly matter.

The situation is rapidly reaching a point where unless these communities are willing themselves to adopt the perfectly reasonable and adequate measure commonly employed elsewhere for its prevention and control, the government of the State will be obliged to interfere and compel obedience to the laws.

It is to be hoped, for the good name of these counties, if for nothing more, that such an issue should be averted, but I may say that the Department expects to maintain sanitary authority in these infected localities, and that if it becomes necessary for its enforcement, the State militia may be called into requisition upon application to the Governor of the State.

The people need enlightenment on several points.

First.— Smallpox actually prevails widely in Lewis and Jefferson counties. Mild cases have here and there been mistaken by physicians for other diseases. A few cases of other disease have been called smallpox and quarantined as such. It is the practice of sanitary authorities in every civilized country to quarantine these doubtful cases until the doubt is removed. But these exceptions are rare and they do not justify the ignorant assumption of the laity that the opinion of the medical profession and the local health officers are to be distrusted.

Second.— Smallpox, mild or severe, is always to be treated as a pestilence. It is not to be treated with contempt merely because it does not kill every third person. It may do that yet in the homes of these same rural savones. It killed 75,000 persons in Persia last year; the epidemics in Vienna and Paris this year have been of the old-fashioned kind. In 1901 in Cleveland there were 1350 cases and only 30 deaths, and the next year with the same number of cases, there were 240 deaths. In the same year in Newark, N. J., the mortality rose from almost nothing to 990 within a few months. In Montreal in 1885, there were 3,150

deaths within nine months. Over 2,900 were among the ignorant French peasant half of the population, who fought vaccination as they are now doing up north; and only 200, among the Scotch and English other half of the population, who had an intelligent understanding of the value of vaccination.

Third.— Only vaccination will protect a community against the spread of smallpox.

Fourth.— In cities and towns local self-government is more thoroughly organized. The public are as a rule well vaccinated and smallpox does not spread.

Fifth.— The city child is vaccinated before entering school as a matter of course, and the law is always observed. It is only the country districts which are making trouble. New York city, Brooklyn, Buffalo, and Rochester are free from smallpox.

Sixth.— Sections 210 and 211 of article 12 of the Public Health Law with reference to vaccination, has been tested in the courts and can be enforced wherever the issue is joined. It has been almost wholly neglected in these three northern counties. In many localities not 10 per cent. of the people are vaccinated. It will be necessary to enforce it in every school district of these three counties in order to convert them into a territory fit for civilized people to live in.

Acquiescence in vaccination, accepting its trivial discomforts and annoyances for the sake of personal safety and the public good, is a test of good sense and good citizenship.

Vaccine virus as now prepared is pure, no diseases are conveyed by it, serious sore arms are unusually rare. When they do occur, they are the result of the patient's own carelessness in breaking the vaccine vesicles and getting the sore infected. If parents and children would heed the injunctions of the vaccinators and not disturb the sore, there would be no infection and no trouble.

I am sending under separate cover a copy of the report of our Annual Sanitary Conference for 1906, with an article by Dr. Wheeler which bears on the subject, and the typewritten matter inclosed is a part of his address at the recent sanitary conference in Buffalo.

If you are willing to lend the influence of your journal to bring these counties to a better understanding of this problem, I am sure you will be lending, not only to them but to the State at large, a very valuable service.

You may use the substance of this communication in any way your judgment dictates. I shall, within a day or two, issue an address directly to the health officers and authorities of the several municipalities concerned.

Very respectfully,

EUGENE H. PORTER,
Commissioner of Health

To all Health Officers and Members of Boards of Health of Towns and Villages and School Boards, City Councils, and School Trustees in Jefferson, Lewis and Oneida Counties

In order to assist you in bearing any responsibility which you may be called upon to assume in the enforcement of sanitary regulations for the control of epidemic smallpox in your several municipalities, I address you the following circular letter of information:

The sanitary control of smallpox is founded on a knowledge of that disease drawn from its history in the past, from a knowledge of the laws of its epidemic nature, and from the practical experience of men whose regular business it is to protect the public health from epidemic invasions of all kinds. This knowledge is the outcome of a careful study of the whole field of observation by competent and trustworthy observers. It is fair to conclude that their deductions are reasonable and wise.

These authorities have established two facts:

1. Every citizen of a state is entitled to the same degree protection against smallpox as any other citizen, and must turn, when called upon, submit to the same sacrifices to insu that protection. So long as a man may carry the disease or se it in a letter from one end of the State to the other in t hours, an outbreak at any one point in the State is a matter common concern to every city and hamlet within its borders. N man can decide for himself how much or how little he will expo his neighbor. It is his duty as a citizen when he has the m

fortune to contract smallpox, to accept loyally the additional misfortune of seclusion from society until he gets well. He should go into quarantine as he would pay his taxes, or serve on jury — for the benefit of all.

In sparsely settled communities where the machinery of government is less complete than in cities and towns, the provision for the enforcement of sanitary regulations is not as thorough as in the cities — but the moral obligation of the citizens is just as great. I want to be understood as not casting any reflection on the loyalty to his State, or on the conception of his duty of citizenship, of any rural inhabitant of the counties of Oneida, Jefferson, or Lewis. I believe they will be perfectly willing to concede the perfect fairness and equity of the above proposition. I am convinced that unwillingness to submit to quarantine regulations during the recent extraordinary mild epidemic has been due to a misconception of the actual significance of mild smallpox as interpreted by intelligent and experienced sanitary observers. This brings us to our second proposition.

Its mild character is everywhere recognized — has prevailed all over the county for seven or eight years. Why is it then that every city in the entire country, possessed of a well-organized health department, fights this mild smallpox with the same relentless vigor that they fought those terrible scourges of 1885 and 1873?

Why is it your locality has had a hundred cases, and Broome county had as many more, and Greene county had 300 or more — and yet Buffalo and New York city, frequently getting a single case, generally from outside, never allow themselves to have a second?

The reason is this: The study of the nature of epidemics is, as we have said, a science, and the epidemiology of smallpox teaches that even mild smallpox never completely loses its quality of being a pestilence. Nobody knows why this epidemic is mild or why one thirty years ago was the most appalling scourge that humanity has known since vaccination was discovered. We do know that epidemics vary greatly in severity, and that mild and severe invasions alternate with unforeseen rapidity. There is reason to fear and believe that the contagious principle of one epidemic

lights the fire of the next. The fires die down and smoulder, but do not go out.

In Columbia county, this summer, smallpox broke out afresh in the same house after thus smouldering in the same house fo over two years. It is not improbable that influences of atmo phere or climate affect the severity.

There are scores of homes in your beloved counties where smal pox poison exists, undisinfected, ready to break out next year, o the year after, and what one of us is wise enough to foretell tha the next epidemic may not bring death, or deformity, or blind ness, or some one of its many ghastly mutilations into any on of these households, and spread like wildfire through the country side? In 1901 Cleveland, Ohio, had 1,296 cases and only twenty deaths, but suddenly the change came, and, in 1902, there were the same number of cases and 240 deaths, and they had to vac cinate 195,000 persons before it was stopped. In the same yea that your people have shown such ill-judged bravado and contemp for the disease and its only remedy, vaccination, Persia has ha 75,000 deaths. The epidemic which broke out in Vienna three months ago was not mild. It was very severe, and so was th Paris outbreak.

There is another reason why we should respect this most dread ful of all the ministers of death, as Macaulay calls it, but our vision must reach beyond our noses back through the experien of a century, and down into the depths of things. Try to pictu in your minds what smallpox meant to the entire world only century ago, and why, save for one thing, it would mean t same now.

Remember, it was a children's disease then, because no one g a chance to grow up without contracting it. Every living adu had had it. Every mother who looked down on her new-born ba knew in her heart that it was an even chance that her babe wou be dead of it before it was five years old, and it was one chan out of three that it would die in a year. It was universal, pe petual. Once in three years, as fast as a crop of children had chance to accumulate, the epidemic came to sweep them off. Ha the survivors were pock-marked, or blind, or crippled. The r cital sounds like a ghostly extravaganza, but it is strictly, h

torically true. And the only thing that stands between the people of this day and the horrors of that is the immense outwall of immunity which the practice of vaccination has built up throughout the civilized world. Every year whether the disease is present or not, or if present, is mild or not, the intelligent, foresighted, prudent part of the community take their children to be vaccinated, putting up with its trivial inconveniences, or rare illnesses, for the sake of greater gain, and every time a smallpox panic gets hold of the people wise men and foolish alike take refuge in this greatest of the gifts of medical science to man.

The problem of the sanitarian who looks forward and back, and not simply under his nose, is to keep the people vaccinated, so that the pestilence shall not catch them unawares. A man with smallpox might walk the length of any street in Germany and go in any store, and no one would take smallpox, because there everybody is vaccinated. It is the same in Japan. Eventually, we shall be as intelligent in such matters as these nations, but we are not now.

But we do know enough not to entertain smallpox. And for this reason in this, as in any other well-governed country, and in all parts of this country, and always, whether the disease kills forty out of a hundred, as it has time and again, or only one out of a hundred, which is its present average, it is to be regarded by everybody as a pestilence, a menace, a danger to the public health, against which every resource of extermination is to be kept constantly in play.

ALBANY, N. Y., *December* 10, 1907.

EUGENE H. PORTER,
Commissioner of Health

As this report closes the indications are that during the remaining winter months outbreaks of smallpox will continue to be frequent throughout the State, and the difficulties of sanitary control remain as heretofore. Gradually, however, local health boards are beginning to understand the inadequacy of quarantine measures, and to appreciate the fact that the only actual safeguard against the disease is general, systematic vaccination of the entire community.

Difficulty of Diagnosis in Smallpox

The following report of Dr. Curtis evidences the occasional difficulty in making a diagnosis of smallpox:

Report on Schenectady Cases.

ALBANY, N. Y., *December* 18, 1907.

DR. EUGENE H. PORTER, *State Commissioner of Health:*

SIR: — The characteristics briefly of rather unusual cases which I have been seeing at Schenectady, are as follows:

A young man aged 24, working in the General Electric works and boarding in Park place, left home November 23d for Sand Lake, via Troy, and returned December 3d. On the night of the day he left, a little child in the family where he boarded broke out with what was called chicken-pox and the history was of that disease; she was ill but a few days and as seen at the end of two weeks shows some slight superficial marks as of pin-head sized healed excoriation. The child was blind, five years old, never away from home and was unvaccinated.

The young man, unvaccinated, had a mild febrile action settir in December 5th, two weeks after leaving home and two da after return; the fever lasted two days when eruption appear abruptly on his face and upper trunk, shoulders mostly. Th was the 7th of December, and I saw him twelve hours after appeared at which time he was well of fever and felt well. H forehead and most of the face was abundantly covered with rais flat lesions, congested rather than indurated, characteristic i duration not being appreciable to touch; of small split pea siz there were small vesicles at the apex of a few. The appearan was of what thus early promised to be confluent smallpox on t face. The shoulder lesions were smaller, there were some vesic which were filled and single chambered the serum contents eva ating readily. There were very few lesions on the body below t upper part, half a dozen on the arms, none on the wrists a back of hands, none on the lower limbs. On the roof of the mo there were abundant lesions.

I went to see him again December 13th, he having been once vaccinated and sent to the smallpox hospital then long

occupied. I found his vesicles all disappeared, the tumefied papular lesions flattened and the inflammation all receding. All lesions were receding and no new ones had appeared from the first. The vaccination showed no evidence of reaction and he was again vaccinated from a different stock.

His brother, aged 29, I went to see the same day; he had been with him intimately though he worked at another place. He had been vaccinated in childhood, having a good scar, and the apparent fact of his escape I had accepted as evidence, December 7th, that the first had smallpox.

He gave a good history of continued fever beginning December 11th, six days after his brother's onset, and like his brother, had a well-marked and considerable eruption over the face, forehead and scalp, some on the wrists, palms, and a few scattered over the body. While thus classically distributed, the lesions were rather broad, tumefied, not indurated to touch, and some were vesicular with single-chambered vesicles. The lesions were like his brother's but less numerous. Febrile symptoms had subsided. His vaccination had not reacted and he was revaccinated and sent to the smallpox hospital.

December 17th, seen again, the lesions had all receded just as with the first case; on the fifth day of eruption all had desiccated, inflammatory action had subsided, leaving only a slight sense of induration to touch. On the wrist three or four turbid vesicles remained.

In neither of these cases was there any reaction to vaccination. Vaccination took well on the members of the family exposed and it is reported to me that a second vaccination done on the little girl was effective.

No known case of smallpox exists in this vicinity. In this changing population there is chance of exposure to wandering undetected cases.

The argument for a diagnosis of smallpox lies in the following:

1. The age of the subjects, for chicken-pox is very rare after the age of 23, though not at all impossible, and these men were both under 30.

2. A fairly marked initial fever of over two days with subsidence of fever on the appearance of eruption. I am not satis-

fied however but that in adult subjects of chicken-pox there is approach to this most characteristic sign of smallpox, save that of subsidence on eruption which I have found not to occur.

3. The location of the eruption, coming first and most abundantly on the face. This with comparative escape of the trunk is I think fairly conclusive evidence in favor of a smallpox diagnosis. Failure of new lesions occurring after the second day is also noteworthy.

But the career of the eruption and the single-chambered vesicles are very extraordinary; I have never seen it abort so early nor with the amount of lesion show so ill-defined induration. I have seen single-chambered vesicles, however, in true variola. The cases seem worth a record.

Very respectfully,

F. C. CURTIS, M.D.

How Smallpox Came to Syracuse

The town of Leyden lies in the center of a territory which included before the year ended fully twenty-five different localities from which smallpox was reported. The following letter and telegram are to be read together. The letter is from an optimistic school trustee, the telegram is from the health officer of the city of Syracuse. They were received at the Department on the same day. While the trustee was serenely denying the presence of smallpox in his community, the health officer of Syracuse was reporting the apprehension of a smallpox refugee from the same town.

WEST LEYDEN, N. Y., *December* 18, 1907.

EUGENE H. PORTER:

DEAR SIR;— I, received some Paper's to day from you about having the school children Vaccinated. Now this may be all right for some large city'es but we live way out in the cuntry and have lot's of Snow and is not nesserry to be Vaccinated as it is to cold and the children are all in the Best of health and their Pearnts don't want them Vaccinated and run the risk of having them take cold in this cold weather we are not afraid of small-Pox in this part of the cuntry small-pox is more afraid of us if eny body

d have small Pox I don't believe that Vaccination would it in the least you Write of People in foreign cuntry's Not g having Small-Pox. they were Vaccionated 40 & 50 Year's ınd have more cases of small Pox then we have in this ·y. Your's Truely

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SYRACUSE, N. Y., *December* 19, 1907.

EUGENE H. PORTER, *Albany:*

se of smallpox discovered to-day. Patient came from Port en a week ago last Friday; wide exposure.

D. M. TOTMAN,
Health Officer

Smallpox — 1907

ty	Place	Date	Number of Cases
ny	Albany	Aug. 1	1
	Coeymans	Aug. 1	1
gany.....	Alfred	Jan. 1	1
	Caneadea	Dec. 3	3
	Ward	Jan. 7, Feb. 10	17
me.....	Binghamton ...	Jan. 1, Feb. 1, Mar. 2.	4
	Deposit	Jan. to Apr. 7.....	70
	Lestershire	Jan. 1	1
	Sanford	May 3	3
raugus.....	Conewango, T.		
	Leon.	Apr. 6, Sep. 8	14
	Machias	May 5, June 2	7
	Randolph	May 2	2
ga	T. Cato	Nov. 3	3
	Ira	Dec. 1	1
tauqua	Jamestown	Mar. 1	1
	Westfield	Feb. 1	1
ıung	Southport	Jan. 1	1
	Veteran	Jan. 1, Feb. 2	3
ango	Norwich.	Jan. 3, Apr. 7	10
on	Mooers	Nov. 1	1
nbia	Valatie	May 1	1

County	Place	Date	Number of Cases
Cortland	Homer	Aug. 1	1
Delaware	Middletown	Dec. 1	1
Erie	Buffalo	Apr. 1, May 2, July 2, Aug. 2	7
	Chaffee	June 3, July 4	7
	Sardinia	June 1, July 3	4
Greene	Catskill	Jan. 1, Feb. 3	4
Herkimer	Russia	Dec. 5	5
	Wheelertown	Dec. 10	10
Jefferson	Carthage	Aug. 1, Dec. 1	2
	Champion	Nov. 1	1
	Clayton	Oct. 5	5
	Ellisburg	Aug. 3, Nov. 1	4
	Henderson	June – Aug. 20	20
	Pamelia	Aug. 2	2
	Rutland	Oct. 2, Nov. 1	3
	Theresa	Dec. 1—	8
	Watertown	July – Aug. 3, Nov. 1	4
	Wilna	Nov. 1	1
Lewis	Constableville	Oct. 1, Nov. 2	3
	Copenhagen	Oct. 1–3, Nov. 5	9
	Croghan	Nov. 4	4
	Denmark	Nov. 2	2
	Diana	Nov. 2	2
	Glenfield	Dec. 2	2
	Greig	Nov. 1	1
	Highmarket	Oct. 1	1
	Leyden	Sep. 1	1
	Lowville	Oct. 2, Nov. 1, Dec. 21	24
	Lyonsdale	Sep. 1, Oct. 1, Nov. 1	3
	Lyons Falls	Aug.– Sep. 6, Nov. 6	12
	Martinsburg	Dec. 3	3
	New Bremen	Dec. 2	2
	Turin	Oct. 2, Dec. 1	3
	Watson	Nov. 1	1
	West Turin	Oct. 2	2
Madison	Lenox	Jan. 3	3

ty	Place	Date	Number of Cases
roe	Pittsford	Oct. 3	3
York	New York City	Jan. 12, Feb. 6, Mar. 3, Apr. 11, May 6, June 7, July 2, Aug. 1, Nov. 1, Dec. 11	60
ara	Niagara Falls	Apr. 2, May 4	6
ida	Annsville	Nov. 1	1
	Boonville	Oct. 19, Nov. 9	28
	New Hartford	Apr. 1	1
	Remsen	Dec. 1	1
	Western	Dec. 2	2
	Utica	Nov. 2, Dec. 3	5
	Whitestown	Oct. 1	1
ndaga	Syracuse	Aug. 1, Nov. 1, Dec. 1.	3
ario	Naples	Feb. 3	3
nge	Middletown	Feb. 1, Mar. 3	4
	Newburgh	Oct. 1, Nov. 2	3
	Port Jervis.	Mar. 1	1
ans	Carlton	June 1	1
ego	Albion	Nov. 4	4
	Parish	Nov. 1	1
	Pulaski	Nov. 7	7
	Altmar	Nov. 4, Dec. 2	6
ego	Springfield	Oct. 1	1
kland	Haverstraw	May 2	2
Lawrence	Norfolk	Apr. 1, May 1	2
	Pitcairn	Nov. 1	1
henectady	Schenectady	June 1, Nov. 1, Dec. 2.	4
huyler	Watkins	Jan. 2, Feb. 3	5
neca	Seneca Falls.	Aug. 1	1
euben	Avoca	Mar. 1, Apr. 1	2
	Corning	May 2, Aug. 1	3
ffolk	Islip	Apr. 1	1
	Shelter Island	May 1	1
npkins	Dryden	Nov. 2, Dec. 2	4
	Ithaca	Oct. 1	1

County	Place	Date	Number of Cases
Ulster	Crawford	May 1	1
	Ellenville	Mar. 1	1
	Kingston	June 1, July 1, Sep. 3, Oct. 1, Nov. 11, Dec. 71	88
	Rochester	Dec. 1	1
	Rosendale	Oct. 1, Nov. 1	2
	Saugerties	July 2	2
	Ulster	Dec. 6	6
	Woodstock	Dec. 1	1
Westchester	White Plains	Apr. 1	1
	North Salem	Nov. 1	1
Wyoming	Arcade	June 1	1
Yates	Dundee	Mar. 1, Apr. 4	5
	Starkey	Apr. 1	1
		Total	586

MALARIA

Epidemics of malarial disease have been investigated at Stony Point, North Tarrytown and West Haverstraw. Recommendations made for the suppression of the disease by drainage and the use of petroleum were not followed by local authorities at Stony Point.

At North Tarrytown a campaign against the mosquito will begin with the early spring, and also at West Haverstraw.

ALBANY, N. Y., *October* 10, 1907.

EUGENE H. PORTER, M.D., *State Commissioner of Health, Albany, N. Y.*

DEAR SIR: — On October 7 I inspected the condition at North Tarrytown in regard to the cause of the recent prevalence of malarial fever.

Malarial fever has prevailed here for only recent time, and to a large degree for this last summer and fall. It was prevalent on streets at the north of the village, on high ground overlook-

the river, and not extensively beyond this locality. It is a marked tertian. Between the elevated site of these streets the river is a large area, some thirty or forty acres in extent, wamp which extended to precipitous slopes of the high ground, l along the river side of which the embankment of the Hud- . River railroad practically bounds it. A wide sluice-way or vert through the embankment gives access of the tidal flow ich partially submerges it, but it is never free from some nding water. It is covered with a growth of coarse grasses d hummocks of the same. The water of the river here is ackish, the amount of salt being considerable, and it flows ice a day over the entire area of the swamp, which is uni- rmly level.

Above the northern end of the swamp and on lower slopes ove the village is the old Philipse Manor House, and the region out and to the westward has been of late years in process of lornment and being laid out with roadways and like improve- ents with the purpose of construction of first class villa prop- rty. As a means of adding to its attractiveness and doubtless remove the unsightliness of the swamp it has been planned to rn the upper end thereof into a lake; and to this end a strong ike has been built across it from the bank to the river, cutting ff one-fourth or one-third of the swamp. Further, a small tream has been turned into this part of the swamp, but not nough to relieve it of its character as a swamp which it still ontinues to be. The result has been to cut off practically all iver water and gradually it has been turned from a salt water to a fresh water swamp. Coincident with this has been the devel- pment of malarial fever in the territory of the village adjacent nd a few hundred yards distant.

The inference is apparent; the anopheles mosquito has found a congenial breeding place in this fresh swampy place and has gained sufficient development to produce this year a very exten- sive scourge of malarial fever in that part of the village ad- jacent to it. I believe it is understood that this variety of mos- quito thrives and develops its larvæ only on fresh water. Of course I take it as understood that this variety of mosquito to- gether with access of it to human blood containing the malarial

parasite whereof it becomes the carrier is the only way in which this disease is spread.

Therefore this swamp thus treated is the cause of the epidemic of malarial fever under consideration. It has not spread far, because the flight of the insect is limited. Indeed I believe there is reason to assume, perhaps borne out by facts of observation, that increments of epidemical prevalence tallied with winds from the direction of the swamp toward the affected locality. This was established in the case of Stony Point under similar conditions, which I investigated a year or so ago. The locality is not however beyond the unaided range of the mosquito. An ideal place is supplied by the swamp and certain old ruined and open structures on its edge for the deposit and development of the larvæ. At this time they were already in hibernation and there are no new cases of disease occurring. When warm weather returns it is certain that there will be a recurrence of the epidemic and very probably in redoubled force if some remedy is not applied.

As to the remedy: Possibly if the intentions of the projectors of the lake are carried out and the lake properly filled and supplied with sufficient fresh water to keep it in such condition as not to be to any degree stagnant, and this lake stocked with minnows and sunfish, the mosquito will not thrive here. This does not appear to me to be likely, for the margin is much of it very flat, and while this may be remedied by building abrupt banks all about it, I think it is unlikely that the small stream flowing into it will supply the condition of freshness to its proper maintenance as a living body of water in which fish will thrive. The only other remedy of a permanent sort is either to drain it and fill it with fresh earth so as to do away entirely with its swampy nature, or to restore it to the condition which existed when it was a part of the main swamp; that is to say open or remove the dike as to overflow it again with salt water. This is certainly the easiest and quickest remedy. A speedy remedy is essential for the affected region will otherwise become uninhabitable.

Prior to that however it is essential that a still more speedily acting measure should be taken, viz: to apply kerosene to the

ole area. It would appear to me that this should be done be-
re the approach of warm weather sufficient to thaw the ice. It
estimated that a barrel of kerosene will spread over two acres
water, but perhaps on solid ice this would not suffice. How-
er with watering pots or sprinklers of some sort it can be
ne over. I would suggest that at the same time the ruined
ilding be likewise treated. A single application will not suf-
e for as soon as it evaporates the effect will be gone. Prob-
y it may be counted on as lasting longer than on water, but
three or four weeks the process ought to be repeated. I should
y that even after the salty water is admitted it would be a safe
ecaution to continue this measure for the prevention of the de-
lopment of the eggs and pupæ.

As a further precaution the people should be warned to protect
e sick with mosquito netting, and all windows as well as porches,
occupied at evening, must be screened. Only by such means
n they hope to escape a fresh visitation of malarial fever.

I believe that the locality can by these measures be restored to as
od a condition as existed prior to the recent epidemic.

Respectfully yours,

F. C. CURTIS, M.D.

The reorganization of the division in July of 1907 was fol-
wed by the appointment of a complete corps of 25 medical
xperts. These experts are men of wide personal experience with
pidemic diseases, and men who are trained in the art of con-
sultation, to render service to health officers in difficulty over
anitary matters, diagnosis, and the like. It is part of their duty
to inspect the workings of health boards in the localities to which
they are sent and to offer advice as to organization, procedure, etc.

JOHN T. WHEELER, M.D.,
Director

DIVISION OF OPHTHALMOLOGY

DIVISION OF OPHTHALMOLOGY

Lowville and Otego sent in reports giving the names and ages of the pupils in each grade, but whether they were all normal and hence the report sheet left unfilled, or whether the examinations were not held, we were unable to determine.

The following are the 21 villages which neglected or bluntly refused to make examinations: Addison, Bath, Bolivar, Brocton, Burdett, Charlotte, Chateaugay, Dobbs Ferry, Dryden, East Randolph, Keeseville, Lyons Falls, Macedon, Massena, Oramel, Penn Yan, Wappingers Falls, Waterford, Waterloo, Watkins, Weedsport.

Much of the correspondence was conducted with the principals of the schools in these villages, who represented the boards of education and managed the campaign. Many of them thought the examination unnecessary, others impractical and others that they could not spare the time. One in northern New York wrote that he was not going "to gratify some cranks on statistics" or send any report unless he was compelled to do so by law. In another village in central New York the health officer when he called to advise about the examinations was received with great discourtesy and the principal said he believed he had received some packages from the Department of Health but had thrown them unopened in a corner, where he proposed to leave them.

Many trustees and school boards were in favor of the examinations but had not the force or energy to compel their teachers and principals to make them. Several wrote that they had directed that the examinations be made and were surprised that they had not been, but no reports were ever received. The criticisms of the principals and trustees were based largely on the fact that the teachers were not competent to make the tests. Almost none of the objectors had heard that the plan had worked successfully in several other states, and none had seen the method practically in use.

This plan was adopted for the following reasons:

1st. Because of its economy. It does not cost the school district one cent, as the State furnishes the cards, blanks and directions for making the examinations.

2nd. It is prompt and causes little disturbance of the school routine, as one day, or at most 1½ days, will suffice for a teacher

to make the examinations in one room. It is the only plan thus far suggested that combines promptness with completeness.

3rd. The method is accurate enough to give parents notice that their children have defects that interfere with their school work, and to enable them to seek competent professional advice through their family physician. The plan is not intended to foster paternalism, but to let parents know the responsibility they have to shoulder in the education and equipment of their children. In every village in this State there must be enough Christian charity for the well-to-do to help the less fortunate when necessary.

If an inspector were employed he would of necessity have to make the tests hurriedly, and, in the large villages, would hardly finish the work during the school year. The teachers have the confidence of their pupils, and the latter are less liable to become nervous and make blunders by incorrectly naming the letters in cases where the vision is perfect.

The total number of pupils whose examinations were reported was 105,767; of these 100,722 had only their eyes tested; and 5,045 were tested as to their hearing and nasal conditions alone. There are in these 446 villages about 5,100 teachers, or one teacher to about 21 pupils examined. In only 184 villages were examinations reported in those under seven years of age.

The children were classified according to age, as follows: 1st, those under 7 years of age whose eyes were not to be examined; 2nd, those from 7 to 10 years; 3rd, those between 10 and 14 years; 4th, those over 14.

Those reported with defective eyes in the second class numbered 35,677; those in the third class, 49,048; those in the fourth, 24,542. Those with defects of the ear and nose and throat in the first class numbered 45,346; those in the second class, 76,048; those in the third class, 89,419; those in the fourth, 64,913.

Each room, and if possible each grade, should be recorded on a separate blank so that the Department would have a better opportunity to observe where the poor tests were made.

A study of the relation of number reported to the population shows a great variation. In the smaller villages it went as high as nearly 50 per cent. of the population enumerated in 1905, and generally ran from 16 to 25 per cent. In the larger villages and

cities of the third class, those with a population exceeding 2,000, the proportion was much smaller, being from 7 to 12 per cent. The tests were much better made in the smaller towns and the reports better prepared and more promptly returned than in the larger villages, where the superintendents and supervising principals were opposed to it or took no interest, when it was made, to see that it was carefully done.

The total number reported with defective vision at 20 feet was 39,243. This was less than 39 per cent. of the total number, probably a much larger per cent. than the facts justify, due to the inexperience of the teachers. None of them had been shown how the test should be made and some showed excessive zeal in recording defects which were due to the nervousness of the children or to the improper lighting of the cards, due to the failure to follow the instructions carefully. If the card is not properly lighted from the side, failure to read the normal line of letters follows.

Thirty-six thousand and sixty-one were reported with inflamed eyes and eyelids, or the latter were swollen and scaly and there was fatigue or strain of the eyes. This, too, is rather excessive, due to the recording of occasional rather than constant conditions. There were probably more subjective than objective symptoms recorded. The intent was for the teachers to record only what they observed; not from questioning the children.

The number with headache, especially among those from 10 to 14 years old, was excessive. 20,129 were reported, the largest percentage falling among the younger children where less would be expected than in the older grades. The excess was due to the teachers recording those who reported in the affirmative when they were questioned regarding the matter rather than from information gained by observation, as was intended.

The number reported as having defective hearing was 10,332. This probably represents a less number than is usually found, being only a little over 9 per cent. of the number examined. From 12 to 16 per cent. is probably nearer the ratio. This failure to detect the average number is due to the inexperience of the teachers and to their not having been shown how the test should have been made.

Those reported as having had earache or having a discharge from one or both ears was one of the most difficult tests. The intent was to record only cases where there was an odor or a discharge to be detected at the time of the examination or that had been found by the teacher previously. Very few were recorded among the lower grades where these defects ought to be most prominent. Many were found in those between 10 and 14 years of age, due as above to getting subjective instead of objective symptoms. The number reported was 10,232.

One of the points of greatest misunderstanding was in reporting those suffering from "catarrh" and "frequent colds in the head" or who were "mouth breathers." The total number reported as suffering from one or both of these troubles was 40,371, or over 38 per cent., a number from one-half to two-thirds greater than the true number, probably, if the examination had been properly conducted. Most of the information seems to have been received from questioning the children, a particularly fallacious method, especially in those below the high school grade. It was intended that the report should be largely made up from the observations of the teachers. They would know whether the child had a condition of the nose that needed constant attention or had such frequent colds as interfered with their progress in school. Questioning the children only brought out the fact that the teacher got a large number of affirmative answers because the children believed such answers were wanted, where the facts would indicate only a comparatively few that ought to be reported, probably not over one-fifth or one-sixth of the whole number examined.

Only 4,401 were reported as wearing glasses, or only about 4 per cent. of the whole number examined. 223, or about 50 per cent., of the villages did not report a single pupil as wearing glasses. This shows a large degree of carelessness in recording the children examined, as everyone knows there is a much larger number than this that are at the present time wearing glasses among the public school children.

There were 22,548 reports sent to parents from 371 villages and towns; from 55 none were reported as sent. The number sent would not be a bad average if they had been distributed evenly

over all the schools, but a large number were in excess of what a study of the tabulated reports of the examination showed could be justified. Parents should not be startled by false reports and go to an expense of an examination without cause, but it is much better to err this way than that any child with a defect of the eyes, ears or nasal apparatus should not have it reported. Cases should not only be reported once, but where no action is taken the parents should have their attention called to the matter a second or perhaps a third time.

In the last column headed "General health & remarks" it was expected that only those would be reported in poor health whose lassitude and general debility was such that they needed the attention of a physician, along with those cases where there was frequent absence due to illness. No other cases were intended for the record. 4,115 were reported as in poor health. It was hoped, under "remarks," to get, through this examination, at the cases having physical defects besides those of the eyes, ears and nose which more or less incapacitated them for their school work. Poor teeth and other deformities, if reported, would do something toward a general medical inspection in improving the children's physical condition.

While the intent of the examination has been fairly well met in apprising parents of the defects of these organs upon which so much of the physical welfare of their children depends, it will accomplish much more when the intentions of the Department are better understood by the public and its necessity fully appreciated. This can be hastened by publicity in presenting the facts to the local papers of the villages, not once but often, until the matter becomes well assimilated by the public mind. Another method is to have the co-operation of the farmers' institutes and lecture courses in presenting these facts to the smaller communities of the State. The attention of students should be brought to the necessity for this work in all our large institutions of learning. Teachers' training classes everywhere, as well as normal schools, should have this matter thoroughly discussed by instructors.

In the normal schools of Minnesota the method and necessity of these examinations are thoroughly discussed, as it is before their teachers' institutes.

soon as this education of the teachers is begun by the De-
ıent of Education we shall at once have results that will
and the respect of the public, which will be convinced that
tests simply mean to show them where lie some of the physi-
ɛfects which lessen the capacity for work of their children.
for them and not the State to correct these troubles so as
ve their offspring a fair chance, not only in school but in
life work.

soon as the teachers are properly instructed and know that
nust be as carefully and conscientiously done as any part of
school work, we shall have much fewer reports without the
school district, grade or any mark save the postmark on the
ɔer to tell where it came from.

little more interest and care will not give us reports with
rades under general health and with all the unnecessary fig-
ɔf normal cases inserted. We hope to largely overcome this
ture by having a sample report sheet filled out and sent with
ards and instructions so each teacher may at once see how
ıke the reports correctly.

e present non-compulsory plan has been more successful than
ıticipated; but while that is a matter for congratulation so
s this work in the villages is concerned, it seems doubtful
ıer it would be possible to make it a success in the country
cts where there is only a single teacher and a trustee who
her opposed to the tests because he knows nothing of their
or takes no interest in seeing the work done.

nnecticut, Vermont and Massachusetts have all deemed it
to pass laws making this examination in their schools com-
ry, while Illinois and some states of the middle west depend
the voluntary co-operation of their teachers in making this
ination. It would seem, however, whether it remains volun-
or becomes compulsory, that its success will be greatly en-
ɛd if the men who are conducting teachers' institutes in the
rtment of Education devote half an hour or an hour to an
ition of the necessity for such an examination in enhancing
hysical welfare of the children, and also in explaining in de-
he method of conducting the examination as well as tabu-
; the results, in order that the teachers may be familiar with
ıatter when they come to make the tests.

With the great power that is lodged in the Department of Education in this State, it would seem that the making of this matter compulsory would be justified and aid greatly in having the examination more widely adopted than it is at the present time.

We are indebted to the Department of Education for furnishing us with a list of the trustees and presidents of the boards of education in the villages, and to the health officers of some of the villages for their co-operation in making the examination a success.

The results seem exceedingly good for a new step in a matter of this kind, which was bound to meet with a large amount of opposition upon the part of those who were uninformed or opposed to any advances or changes in their educational methods.

Another matter that has received considerable attention in this Department has been the matter of ophthalmia neonatorum, which the census of the blind of this State, recently completed under the direction of the New York Commission for the Blind, shows is causing about 30 per cent. of those who have lost their sight. This is an entirely unnecessary form of blindness, and due to carelessness or ignorance. The vigorous work that has been pushed in bringing this matter to the attention of the medical profession and the public in the last year, has resulted in getting the physicians stirred into active work for suppressing this misfortune, which befalls such a large proportion of our babies.

Ophthalmia neonatorum was put some time ago upon the list of contagious diseases by the Department. A campaign of education regarding this matter must be undertaken, and leaflets and pamphlets distributed by settlement workers in our large cities as well as in a public way to the mothers in our rural communities through the farmers' institutes and other means.

HERBERT D. SCHENCK, M.D.,
Consulting Ophthalmologist

REPORT

OF THE

ANTITOXIN LABORATORY.

[329]



REPORT OF ANTITOXIN LABORATORY

Hon. EUGENE H. PORTER, *State Commissioner of Health, Albany, N. Y.:*

DEAR SIR: — I have the honor to report herewith the work carried on in the Antitoxin Laboratory during the sixth year of its existence, for the calendar year 1907.

Owing to the crowded condition of the laboratory building and its unsuitable construction for laboratory purposes it is becoming more and more unsatisfactory for work of this special nature. A modern fireproof and hygienically constructed laboratory building is most seriously needed for the Department's laboratory services and efforts should be made to obtain the same at no great distant date. A small accident in the work of either laboratory might easily leave the Department without laboratory facilities.

Diphtheria Antitoxin

The number of places which have received antitoxin from the laboratory has not been greatly increased, while the total number of places which have received antitoxin since the inauguration of the work has increased and most of the same keep a stock on hand, some do not renew their supplies as frequently as the rules permit. However, as the amount of antitoxin in a vial will be maintained for considerably over a year the Department has not advocated the renewal of the supplies as frequently as formerly.

Table I shows the status of this distribution since 1901.

	1902.	1903.	1904.	1905.	1906.	1907.
Cities supplied	30	42	42	42	42	42
Villages supplied	161	204	617	691	793	828
Towns supplied	171	280				
Totals	362	526	659	733	835	870

TABLE I

The amount of diphtheria antitoxin distributed in 1907 was the largest in our history, namely the equivalent of 23,629 bottles of 1,000 units each. The progress of the work is clearly shown in Tables II and III.

TABLE II

Distribution of Diphtheria Antitoxin by Years

Nine months of	1902	6,552 bottles
Full year	1903	14,121 "
	1904	16,374 "
	1905	16,308 "
	1906	17,794 "
	1907	23,629 "

TABLE III

Showing Potency of Serum Issued

1902, 300 units per cubic centimetre.
1903, 325 " " " "
1904, 375 " " " "
1905, 350 " " " "
1906, 350 " " " "
1907, 450 " " " "

No improvement is to be noted in the making of reports on the results obtained from the use of antitoxin on the part of physicians. They have always been far from complete.

There has always existed a tendency on the part of physicians to report the fatal cases and to neglect to report the recoveries. It is not surprising that this state of affairs exists, for in order to report the result of the case in a patient who has recovered, the physician must delay sending his report for two weeks or longer in order to be able to state the fact of recovery, while in the cases ending in death the report can be sent in much earlier and while the information is fresh in the physician's mind.

Reports have been made upon the results obtained from the use of antitoxin in 2565 persons. Of these, 1,330 were ill with

phtheria from the clinical or bacteriological standpoint or from th, and the treatment was intended for curative purposes.

In the other 1,235 persons the injections were made for the urpose of preventing the disease.

We shall consider the treatment of 1,330 persons because of the resentation in them of symptoms of diphtheria. Of these 128 nded in death giving a mortality of 9.5 per cent.

The mortality slightly exceeds those reported during the first w years of the distribution and is about the same as last year, s is shown in Table IV. This increase is to be accounted for by he fact of the tendency of physicians to neglect to report the sults in recovered cases. The continued success of antitoxin reatment lessens the necessity for the presentation of statistical tudies to support it and the labor of reporting results on the art of the physicians becomes more irksome. The work on the art of the laboratory in collecting the reports becomes therefore nore and more difficult. Unless considerably more money becomes available for the extra clerical assistance which would be needed it will not be possible to collect complete reports in all cases.

TABLE IV

Showing Mortality Rates in Different Years

	1902.	1903.	1904.	1905.	1906.	1907.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
Mortality in all cases treated....	8.3*	8.6	8.5	8.4	9.5	9.6
Mortality in cases either clinically or bacteriologically diphtheria.....	†	8.8	8.9	8.5	9.3	†

The great importance of giving antitoxin injections at the earliest possible moment in the course of the disease is most clearly shown in Table VI, which indicates the number of cases injected on each day of the disease with fatalities in each group.

* A series of errors exist in the figures as given in the appendix of the Twenty-third Annual Report for 1902, page 909, beginning with line 14. The original manuscript read as follows:
"These incomplete returns show that 482 cases of diphtheria were treated and over 3,000 additional well persons were protected from the disease by means of the State antitoxin. Of these 482 cases the reports were incomplete in that the final result was not stated in sixty-one and bacteriological examination showed that twenty-three more were not diphtheria.
"Of the remaining 398 cases, a positive bacteriological diagnosis was not recorded in 244, although clinically all the cases were diphtheria. Of the 154 remaining cases three ended fatally, and of the 244 cases thirty did not recover. Two of the twenty-three cases shown not to be diphtheria also died."
"Of the 398 cases there were therefore thirty-three deaths, a fatality of 8.3 per cent."
† Not estimated.

TABLE V

Showing Influence of Time of Injection of Antitoxin

Days of First Injection of Antitoxin

	First.	Second.	Third.	Fourth.	Fifth and over.	Not stated.	Totals.
Cases	284	378	200	94	112	134	1,202
Deaths	10	14	30	11	39	24	128
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
Fatality	3.4	3.6	13.0	10.5	25.0	15.1	9.6

These results are in harmony with those shown for the last three years, as can be seen in Table VI.

TABLE VI

Showing Mortalities in Cases Injected on Various Days of the Disease for Five Years

Days of Disease of First Injection

YEARS.	First.	Second.	Third.	Fourth.	Fifth. and over.	Not stated.	All cases.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
1902	3.2	6.6	9.4	21.2	20.0	1.6	8.3
1903	1.0	2.8	10.1	15.6	24.3	6.8	8.6
1904	.9	4.7	10.9	16.6	18.0	17.7	8.4
1905	2.3	5.0	5.1	18.1	21.0	3.5	8.4
1906	3.6	7.1	10.0	11.4	18.0	16.8	9.5
1907	3.4	3.6	13.4	10.5	25.0	15.1	9.6

Undoubtedly the number of deaths which occurred in the cases injected on the first day of the disease is not correctly indicated in Tables V and VI, for the reason that an unusual number of physicians recorded as the first day of the disease the day on which they were called to see the patient. Except in cases of accidents, other complicating diseases, in very young or unusually frail children, and when very small doses of antitoxin are given, it is most uncommon to note a fatal termination in a patient injected on the first day of the disease.

Inasmuch as the facts obtained from study made in past years of the reports sent in as to the relation of the clinical and bac-

teriological diagnoses to the mortality rate, and as to the frequency of the causes contributing to the unfavorable outcome have been so nearly uniform for each year that no attempt need be made at this time to give the results of such a study for 1907. The statistics can well be allowed to accumulate for several years and then studied as a whole with more satisfactory results.

As has been mentioned above, reports on the use of the Department's antitoxin in 1,235 well persons have been received. This is an unusually small proportion of those receiving such doses. In past years the number has been much larger owing to the extensive immunizations in State hospitals and institutions at the onset of threatening epidemics, but these have not occurred during the last two years. On the other hand, there has been an increase in the private physicians' reports of the use of antitoxin for this purpose.

Of the 1,235 persons immunized, 2 developed diphtheria within a period of one month from the date of injection. All of these cases were mild and recovered rapidly.

Tetanus Antitoxin

The distribution of tetanus antitoxin has been somewhat less than in the last two years. It consisted of an amount equivalent to 4,057 bottles of 1,500 units each. This was divided into 340 doses of 10,000 units each and 1,789 doses of 1,500 units each.

Facts are not available which will show the number of cases of tetanus which have occurred during the year, but it is quite probable that there were less than usual. Our attention, at least, has been called to the disease somewhat less than last year. Reports upon the use of our antitoxin in actual cases indicate that the number which occurred owing to Fourth of July accidents has certainly decreased. A large part of this decline in the incidence of the disease at this time of year is due to the use of prophylactic injections of tetanus antitoxin in the treatment of such injuries.

While the medical profession and the public have begun to learn that Fourth of July injuries carry with them great danger of tetanus, they have yet to fully realize that injuries other than these are frequently followed by lockjaw, and that in the treat-

ment of such injuries tetanus antitoxin administered subcutaneously in small prophylactic or immunizing doses is a sure preventive agent.

The number of reports returned in 1907 is no indication of the large number of injections of State antitoxin which are being administered for the prevention of the disease in injured persons in all parts of the State. The efforts of this Department looking toward the prevention of this disease in toto are bearing some fruit.

Antitoxin Syringes

The item in the appropriation bill for the antitoxin laboratory for the year beginning October 1, 1907, required the distribution of the antitoxin in "aseptic tubes." This was understood to mean syringes and plans were immediately formed on that date to start that work. An improved syringe has been devised and the work of distribution will be begun during the year. The extra appropriation will not be sufficient to cover the added expense of the syringes if the present increase in the amount of diphtheria antitoxin distributed should be still further added to. Moreover, it is desirable to try out the syringe system by exhaustive tests in which time will be an important factor. It may not be possible therefore to begin the actual distribution of syringes as early as we would like.

Concentrated Antitoxin

During the year a large proportion of the antitoxin distributed has been the purified and concentrated serum prepared by an improved Gibson's method. No untoward effects from the use of this product have been reported and in fact we have had less complaint from the skin disturbances due to the injection of antitoxic serum than in the last few years. The purified concentrated serums have in the hands of others greatly reduced these annoying sequelae of the antitoxin treatment of disease.

The educational work conducted by me has already been mentioned in the report of the Hygienic Laboratory.

Respectfully submitted,

HERBERT D. PEASE, M. D.
Director

REPORT

OF

HYGIENIC LABORATORY.

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With the great power that is lodged in the Department of Education in this State, it would seem that the making of this matter compulsory would be justified and aid greatly in having the examination more widely adopted than it is at the present time.

We are indebted to the Department of Education for furnishing us with a list of the trustees and presidents of the boards of education in the villages, and to the health officers of some of the villages for their co-operation in making the examination a success.

The results seem exceedingly good for a new step in a matter of this kind, which was bound to meet with a large amount of opposition upon the part of those who were uninformed or opposed to any advances or changes in their educational methods.

Another matter that has received considerable attention in this Department has been the matter of ophthalmia neonatorum, which the census of the blind of this State, recently completed under the direction of the New York Commission for the Blind, shows is causing about 30 per cent. of those who have lost their sight. This is an entirely unnecessary form of blindness, and due to carelessness or ignorance. The vigorous work that has been pushed in bringing this matter to the attention of the medical profession and the public in the last year, has resulted in getting the physicians stirred into active work for suppressing this misfortune, which befalls such a large proportion of our babies.

Ophthalmia neonatorum was put some time ago upon the list of contagious diseases by the Department. A campaign of education regarding this matter must be undertaken, and leaflets and pamphlets distributed by settlement workers in our large cities as well as in a public way to the mothers in our rural communities through the farmers' institutes and other means.

HERBERT D. SCHENCK, M.D.,
Consulting Ophthalmologist

REPORT

OF THE

ANTITOXIN LABORATORY.

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The third group consists of supplies, the quality of which is either open to very strong suspicion or is notoriously bad. Of these there are ten.

In general, the frequency with which examinations of any particular supply have been made has depended upon the quality of that supply and the special problems which were found to be connected with it. Particular attention has been paid to the efficiency of the various types of water filtration systems.

In presenting my report on this work, I shall give an outline on the character of the systems, with comments upon the same, drawing attention especially to critical points. Subsequently, the results of the examinations will appear as Table I.

Albion

The water supply is furnished by the Albion Water Works Company.

The original supply came from wells. They are twelve in number and are about 120 feet deep. Near the wells is a sand bed 100 feet long, 50 feet wide and 10 or 12 feet deep.

Our information from the Health Officer is that a pipe from the canal leads to this sand bed or filter, and that the effluent from the filtering area is supposed to mix with the well water.

The water company has also built an impounding reservoir on Otter creek, and this is also piped to the filter area.

A sample of water received when the wells only were being used showed the tap water at that time to be of good sanitary quality.

Later a sample taken from the tap gave high bacterial counts and bacilli of the B. coli type were prevalent. We were informed that some Otter creek water was being used at this time.

Samples from the reservoir on Otter creek taken at this time showed the water to be of poor quality, and the Health Officer's inspection of the surroundings corroborates the analysis.

The well water is of good quality but limited in quantity.

The evidence at hand indicates that the auxiliary sources do not furnish water of a satisfactory quality.

The board of trustees of the village have appropriated a modest sum to be used in investigating possible sources for a new supply

When part of the supply is taken from the canal or the reservoir on Otter creek the supply for Albion should be placed in Group No. 3.

Amsterdam

The water supply is furnished by the municipality. Water is obtained from several creeks and storage reservoirs.

Analyses of the water made last summer indicate the presence of considerable organic matter and bacilli of the B. coli type were present in the majority of the inoculations of ten cubic centimeters and one cubic centimeter of the water.

Since 1906 the reservoirs have been treated at times with copper sulphate to arrest algæ growths. The use of this chemical was advised by the U. S. Department of Agriculture to whom samples of the water were sent.

The water supply of Amsterdam belongs in Group No. 2. The growths of algæ in the warmer months make the water unpleasant and would cause more criticism from consumers than dangerous pollution does in many places, because the algæ produce tastes and odors that are quickly noticed by the consumer.

Avon

The water supply is furnished by the municipality. The supply is obtained by gravity from Conesus lake.

The intake for Avon's supply is located near the outlet end of the lake.

The shores of Conesus lake are occupied by farms and summer cottages.

The cottages are owned by local people and by residents of Rochester and other places. Passenger boats ply the lake, and there are frequent excursions and picnics along the shores during the summer months.

These conditions must necessarily pollute the lake more or less and there have been efforts made by Geneseo and the other villages using the lake as a source of water supply to have certain nuisances abated.

The transient character of the summer colonies, the number of excursionists and the plying of passenger boats upon the lake make the danger from infection decidedly greater than would an

equal fixed population along its shores. The water is of a character that would probably cause trouble from algæ growths, with their accompanying tastes and odors.

Geneseo and Livonia also obtain their water supply from Lake Conesus but pump their water from different intake points.

The supply of Avon belongs in Group No. 2 although the conditions on and about Lake Conesus might place it in the questionable class in the future.

Ballston Spa

The water supply is furnished by the municipality.

Water obtained from small springs and streams. There are three distributing and storage reservoirs drawing water from a watershed of from 1,500 to 2,000 acres.

Part of the supply is pumped to a standpipe. The remainder is distributed by gravity.

Analyses show the water to be of fair sanitary quality, but since 1905 there has been more or less trouble during the warm months from algæ growths.

From the sanitary aspect this supply belongs in Group No. 1. The algæ affect the æsthetic and not the sanitary quality.

Batavia

Visited December 6 and 7, 1907.

The water supply is furnished by the municipality.

The present supply of Batavia is pumped from Tonawanda creek which is dammed about one-half mile west of the center of the city.

The city has appointed a commission to investigate a possible source for a new supply.

It is contended that a former channel of the creek now filled with gravel lies but a short distance from the present creek and they hope, by tapping this vein of underground water, to obtain sufficient water of a desirable quality to supply the city.

The railroad, when locating a foundation for a bridge, found it almost impossible to control the ground water with powerful pumps. This fact encourages the local people to hope that water in sufficient quantity can be obtained to supply the city.

Batavia's supply should be classed in Group No. 3.

Canastota

The water supply is furnished by the municipality and comes from small streams. There is a storage and distributing reservoir holding about 7,000,000 gallons.

The stream that supplies the reservoir runs along the Lehigh Valley railroad bank for some distance and is crossed by the railroad several times; this gives an opportunity for pollution by passing trains. A typhoid epidemic was attributed to this probable cause in the winter of 1905–6.

There is a broken stone strainer in use, but as regards purification this cannot be considered a filter.

The municipality owns land around the reservoir site but not along the stream feeding it.

The danger of pollution along the railroad embankments places this supply in Group No. 3.

Carthage

The water supply is furnished by the municipality and is obtained by pumping from the Black river. The intake is in the village. There are no municipal sewers but there are some private drains leading into the river.

The river at this point is polluted with pulp wastes and the drainage from the upstream hamlets.

True to the river's name, the water is highly colored and uninviting in appearance.

There are opportunities for pollution and the local authorities are considering a gravity source on Indian river.

Carthage's present supply belongs in Group No. 3.

Catskill

The water supply is furnished by the municipality. The water is pumped from the Hudson river. The intake is situated about one mile above the confluence of Catskill creek with the Hudson river.

The water is pumped to a storage and distributing reservoir having a capacity of about 2,500,000 gallons.

Tests were made by the Department to ascertain if the water from Catskill creek, carrying the sewage of the village of Catskill,

backed up at times towards the intake during high tides. This was not demonstrated as being so on any day that samples were taken.

Cohoes

The water supply is furnished by the municipality and is Mohawk river water pumped by water power from Cohoes Company's canal.

There are three reservoirs.

Reservoir No. 1 holds 4,500,000 gallons; No. 2, 10,000,000 gallons; and No. 3, 60,000,000 gallons.

Under ordinary conditions much of the water reaches the consumers almost directly from the pumps. This does not give an opportunity for any improvement which might be obtained from sedimentation.

The winter typhoid death rate for Cohoes is high year after year, the general experience of cities using polluted water supplies.

Analyses of the water show that bacilli of the B. coli type, typical intestinal bacteria, and hence indicators of sewage pollution are persistently present in one cubic centimeter inoculations and frequently present in quantities as small as one-tenth of a cubic centimeter.

The analytical data, the amount of known pollution which the Mohawk river receives above Cohoes, and the statistics of deaths from typhoid occurring in Cohoes, all show the necessity for a better quality of drinking water, either from an entirely new source or by filtering the water obtained from the present source.

The Cohoes water supply belongs unquestionably in Group No. 3.

Clayton

The water supply is furnished by the municipality.

The village is situated on a peninsula jutting out into the St. Lawrence river.

The water is pumped from the St. Lawrence river. The intake pipe extends out about 1,400 feet from the head of the peninsula and the inlet is in about sixty feet of water.

The main sewer outlet for the village parallels the water pipe practically in the same ditch, but does not extend out so far into the river.

The water pipe is laid on the irregular rocky river bottom and any leaky joint in this pipe near the shore could take in sewage from the sewage outlet.

On the upstream side of the peninsula a small sewer serving a few houses enters the river and sewage from this source might reach the intake.

The Clayton supply is a questionable one to place in Group No. 2 as the typhoid record almost justifies the placing of the supply in Group No. 3.

Dobbs Ferry

The water supply is furnished by the Consolidated Water Company of Suburban, N. Y.

The water comes from the Pocantico watershed and is taken from the downstream end of a reservoir or lake, known as Pocantico lake which has a storage capacity of about 80,000,000 gallons. The water is filtered through filters of the horizontal pressure type. There are four filter units. The coagulant is mixed with the raw water in a baffled coagulating tank, the level of the raw water being about thirty feet above the filters.

The effluents discharge into a pump well and the filtered water is pumped to an open reservoir, from which it flows by gravity to the distributing system.

At Ardsley there is an auxiliary pumping station and about 300,000 gallons a day are pumped for the high service which is supplied from a standpipe.

The Consolidated Water Company furnish water from the same plant to the villages of North Tarrytown, Ardsley and Hastings, as well as Dobbs Ferry, all the water coming from the Pocantico lake source through the same pipe. It requires careful operation of the filters to maintain this supply in Group No. 2.

Dunkirk

The water supply is furnished by the municipality.

Dunkirk pumps water from Lake Erie, the intake pipe extending from a peninsula about 1,100 feet into the lake, the intake be-

ing in about 35 feet of water. This peninsula is not thickly inhabited and lies in the western part of the city. The sewers of Dunkirk enter a bay east of this peninsula, and there is a government breakwater in front of this bay.

Canadaway creek, carrying the sewage of Fredonia, enters Lake Erie on the west of the peninsula less than two miles from the intake point. It is said that the water from the creek, when the lake is smooth and the creek is in flood, can be traced by its color directly over the Dunkirk intake.

The health officer stated that typhoid is prevalent and that last winter there were over a hundred cases of intestinal disturbance, diarrhœal in character.

Dunkirk's supply is fair to questionable and we have placed it in Group No. 2. Further study of the problem might change the classification.

Fredonia

The water supply is furnished by the municipality and is obtained by gravity.

On the west branch of Canadaway creek, south of Laona and northwest of Shumla, there is a reservoir impounding about 92,000,000 gallons of water.

Lower down the stream is the distributing reservoir, with a capacity of about 9,000,000 gallons.

At times the water is somewhat turbid and there is also some trouble from algæ growths.

From the sanitary aspect, this supply is of Group No. 2 quality.

Glens Falls

Water furnished by the municipality.

Water obtained from three brooks which take drainage from the slopes of the east side of the Luzerne mountain.

On Wilkie brook, which was the first brook on which a dam was built, there is a distributing reservoir of 1,500,000 gallons capacity. Two and one-half miles up the brook there is a storage reservoir thirty to thirty-five acres in area and the water is seventeen feet deep at the dam.

On Keenan, or Beach brook, there is a distributing reservoir of 3,000,000 gallons capacity, and one and one-half miles above or

the same stream there is a storage reservoir of eighty acres in area when full, and the dam is 85 feet high.

The distributing reservoirs are about 250 feet above the city.

The water supply for Glens Falls belongs to Group No. 1. The greatest trouble, that of algæ, is an æsthetic one rather than one of sanitary quality.

Gloversville

A small part of the north end of the city, which was formerly known as Kingsboro, uses some water which is supplied by the Kingsboro Water Works Company. This water is supplied from springs by gravity and is used by a limited number of people.

The city as a whole is supplied with water by the municipality. The water is obtained by gravity from springs and streams on the Mohawk and Sacandaga watersheds.

There is one storage reservoir of 120,000,000 gallons capacity and seven distributing reservoirs of comparatively limited capacity, the total capacity of the distributing reservoirs being about 20,000,000 gallons. At times some of the reservoirs contain algæ growths and copper sulphate has been used to treat them.

The pipe lines from the different reservoirs are so arranged that it is possible to supply certain parts of the city with water from several different reservoirs at the discretion of the superintendent.

The Gloversville water supply belongs in Group No. 2.

Green Island

The water supply is furnished by the Green Island Water Supply Company. The water is obtained from an excavated well located on an island in the Hudson river between the State dam at Troy and the D. & H. Co. bridge between Troy and Green Island.

The water is pumped through a twenty-inch main to a gravity mechanical filter plant. The filters are of the Jewell high-gravity type. There are two units of a nominal capacity of about 500,000 gallons each. Alumina sulphate is used as a coagulant and is supplied by gravity to the individual filter units. The head on the alum solution is controlled by a ball-float valve. The rate of the flow from the individual units is regulated by Weston controllers.

The effluents are discharged into a concrete pure-water well and

Lockport

Visited December 5, 1907. The water supply is furnished by the municipality. Present supply is taken from the canal and pumped into the distributing mains, about 3,500,000 gallons per day being used.

Wells and cisterns are now quite general and the local people say that very little, if any, water from the city supply is drunk.

Lockport is now introducing a new supply.

A pumping station is to be established at North Tonawanda and water from the Niagara river, taken at a point 1,400 feet from the American side of the main river channel, will be pumped through a thirty-inch steel-riveted and lock-bar jointed pipe.

They have already built a standpipe 126 feet high and 25 feet in diameter.

The Lockport people base their judgment of the quality of the new supply on the experience of North Tonawanda, which takes water from an intake in the Niagara river at that place.

Lockport's present supply is of Group No. 3 quality and the present efforts to obtain a better supply were decidedly necessary.

Massena

The water supply is furnished by the St. Lawrence County Electric and Water Company. The water is obtained from the power canal and is pumped by electrically driven pumps into the mains.

The power canal takes its water from the St. Lawrence river some miles above Massena.

The company was to install a filter plant, but up to December, 1907, the plant was not completed.

The St. Lawrence when it reaches Massena carries the sewage of Ogdensburg and other upstream places. Up to September, 1907, dredging was carried on in the canal and this work and the presence of the workmen on the dredges, etc., did not improve the quality of the water pumped from the canal.

Massena's supply we have placed in Group No. 2, though should be properly filtered to render it safe.

ıe water furnished the consumers is turbid at times and the itions at times would favor the growth of algæ.

ıe water furnished Johnstown belongs in Group No. 2. Being .rface supply, it is subject to surface wash at times.

Kingston

:he water supply is furnished by the municipality and is ob-ıed by gravity from Cooper's lake and Sawkill creek. The inage area is about thirty-five square miles and there are stor- reservoirs for the raw water. There is a separate high-ssure and low-pressure service.

Fhe water is filtered through mechanical pressure filters of the izontal boiler-shell type. The capacity of the plant is 6,000,000 lons.

At times during the year the raw-water reservoirs contain algæ wths. Ordinarily no coagulant is used, but when the raw :er is turbid alum is used as a coagulant.

There are opportunities for some pollution on the watershed, ticularly in summer.

Kingston's supply belongs in Group No. 2. There are some op-tunities for pollution, and better efficiency could be obtained m the filters than has been the practice at this place.

Little Falls

The water supply is furnished by the municipality. The supply obtained by gravity from Beaver and Spruce creeks.

The distributing reservoir has a capacity of 25,000,000 gallons d is supplied by one conduit carrying water from both ıtersheds.

Beaver reservoir holds 1,000,000 gallons, Spruce reservoir holds ,000,000 gallons and the Klondyke reservoir holds 700,000,000 llons. The water from the Spruce creek supply carries consider-ıle color. There is a sand filter for the Spruce creek supply.

At the outlet gatehouse from the distributing reservoir there is coke strainer. While this might hold back some of the algæ that row in the water at times, it cannot be expected that this ar-ıngement produces any satisfactory bacterial purification.

The Little Falls supply falls into Group No. 2.

neck river, which receives the water from the outlet of St. Mary's lake. In the northern part of the town of Mamaroneck on the White Plains road is a reservoir holding about 15,000,000 gallons.

About 800 feet downstream from this reservoir is the filter plant and pumping station.

The filter plant consists of mechanical filters of the horizontal pressure type. There are four units about eight feet in diameter and twenty feet long.

The alum solution is fed by gravity into the suction well. The intake is in the bottom of the stream and a pipe leads the water into a stone well about twelve feet in diameter. The pump suctions are in this well.

The lump aluminum sulphate is placed in a wooden tank, and water is allowed to enter near the bottom of the tank, dissolves some of the alum and by displacement the alum solution so produced runs into a pipe leaving the tank near the top and through this pipe reaches the suction well and mixes with the water that is pumped into the filters.

This is a crude arrangement. It would be much better if a solution of alum of a definite strength was made up in the alum tank and then by means of an orifice upon which a constant head was maintained the alum solution was fed to the suction well at a reasonably uniform rate.

Mt. Vernon's supply belongs in Group No. 2.

Newburgh

The water supply is furnished by the municipality and is principally gravity from Silver stream, which feeds the storage reservoir, called Washington lake. The city is taking at the present time practically the whole flow of the stream except what is lost by leakage at the diverting dam. Since the dam has been at the present elevation it is seldom that the water is high enough to flow over it.

The water area of Washington lake when full is 183 square acres.

The water along the shores of Washington lake is comparatively shallow and when the water is lowered in the dry season these shores are exposed to conditions that encourage algæ growths.

There are opportunities for pollution upon the watershed.
Most of the city is supplied by gravity from the lake, which is bout 285 feet above the Hudson river level.
The high service reservoir, which supplies a comparatively small part of the city, is 55 feet above Washington lake, and water from the lake is pumped into this reservoir.
The Newburgh supply belongs in Group No. 2.

ALBANY, N. Y., *October* 2, 1907.

. H. D. PEASE, *Director State Hygienic Laboratory, Albany, N. Y.*

EAR SIR:— The report of the visit to Newburgh, which I made tember 28, 1907, follows:
ccompanied by Dr. Wm. H. Snyder, health officer of the city Newburgh, also of the town of New Windsor, a visit was made he premises complained of as maintaining a nuisance.
he property is situated on the left bank of Silver stream in angle formed by the stream proper and the conduit leading to Newburgh reservoir. There is a dam just below this point, and ctically all the water is diverted into the Newburgh water ply. I was informed that in the last three years the water has lom passed over the crest of the dam.
ne of the occupants of the place informed us that she had ut twenty-five boarders at a time stopping at her place during summer. As these are transients, the majority probably stay- about two weeks, the number of individuals that use the prem- during the summer is easily estimated, and that any insanitary dition would be a danger to Newburgh's water supply cannot questioned.
n the premises stood a vault so full that the excreta was piled ut one and one-half feet above the surface of the ground, and nediately behind this vault, not ten feet distant, was a ditch ling toward the stream. Nearer the stream stood another privy, lently used now as a henhouse. These privies were within 130 of the high-water line at points where there were depressions he bank, and, therefore, violated the water rules.
gave Dr. Wm. H. Snyder notice to the effect that as the repre-

sentative of the State Department of Health, I requested him to notify the health board of the town of New Windsor to have the nuisance removed within twenty-four hours from the time beginning Monday morning, at 8 a. m., September 30, 1907. Attended the town board meeting, and they directed the health officer to serve such notice on the owner.

I suggested to Dr. Snyder that for the safety of the water supply it would be well if the water commissioners would have the work done by men under his direction. He agreed that he would serve the notice on the owner, and if the commissioners agreed would offer to do the work for the owner under these conditions.

I inspected the watershed for a short distance upstream from this point, and it would seem very desirable for the city of Newburgh to obtain control of some of the property along the bank of the stream, so as to protect their water supply from pollution and to render such conditions as explained above impossible.

Yours respectfully,

LEONARD M. WACHTER,
Sanitary Chemist

New Rochelle

The water supply is furnished by the New Rochelle Water Company and is obtained principally from the Hutchinson river watershed.

The highest reservoir on the Hutchinson watershed, or Reservoir No. 1, has a water area of about sixty and one-half acres and holds 271,000,000 gallons. When the water is low in this reservoir water is pumped from Troublesome brook in the city of Yonkers, north of Tuckahoe.

The overflow from Reservoir No. 1 flows into a lower reservoir and at times water from this reservoir and also from some tubular wells farther downstream is pumped into the New Rochelle supply.

The drainage area of Hutchinson river furnishing the supply is about 2,130 acres.

No purification processes are employed, but the company owns over 1,000 acres upon the watersheds, much of which is fenced in.

This supply belongs in Group No. 2.

Newark

The water supply is furnished by the municipality. Most of the supply is underground water collected by vitrified clay tile laid about five feet below the surface.

The tile that collect the water are laid under a public highway, and intercept the underground flow coming from the gravel soil. The ground surface on one side of the street slopes toward the street and has a considerable rise a short distance back from the street. The houses built along this street have privy vaults and the underground water must carry the seepage from these vaults.

Analyses of the water from this source show effective nitrification by soil filtration.

The water collected from this underground source is conducted by a vitrified tile pipe line to an open reservoir and from here is pumped into the distributing system and standpipe. Besides the water from this source some water is obtained from tubular wells.

The Newark water supply is of Group No. 2 quality.

Niagara Falls

The water supply is furnished by two distinct parties. The north end of the city is supplied by the municipal plant and the south part by the Niagara Falls Water Works Company. The municipal plant obtains its water from the old power canal. The water in the canal is taken from the Niagara river at the eastern shore and is carried in the canal, a considerable distance through the city before it reaches the intake point of the municipal pumping station. This water is pumped directly into the mains. There are no reservoirs.

The Niagara Falls Water Company obtains its water from the newer power canal. This water also comes from the Niagara river at nearly the same point in the river as the water for the other power canal, but does not flow far through the canal before reaching the pump well of the Niagara Falls Water Company.

There is a mechanical filter plant connected with the water company's works, but it is not large enough to supply all the water consumed at times and raw water is allowed to be mixed with the filtered water furnished the consumers.

The filter plant consists of nine units of the Morrison gravity

type, being wooden tubs about sixteen feet in diameter. When washing the filters the sand is agitated by mechanical rakes. The individual units do not have an automatic rate controller on the effluent discharge pipes.

The filtered water flows into a pure-water reservoir and from here is pumped to the distributing system and standpipe. The deficiency in quantity is made up by allowing unfiltered water from the power canal to mix with filtered water pumped to the consumers.

Both these supplies belong unquestionably in Group No. 3.

Ogdensburg

The water supply is furnished by the municipality and is obtained from the Oswegatchie river. The intake is in the city and there is a possibility of some local pollution besides the pollution from the sewage of Gouverneur, Heuvelton and Rensselaer Falls. The water carries considerable color, which gives it an unsatisfactory appearance. It also contains considerable vegetable matter, but is quite soft. For some time the Department has been cooperating with the local authorities and steps are being taken to improve the water supply. To place Ogdensburg's supply in Group No. 2 is being lenient, and it should be improved in quality.

Oneida

The water supply is furnished by the municipality. The water is obtained by gravity from a small brook. The water is impounded in two storage reservoirs built in ravines along the stream. The old reservoir has a capacity of 22,000,000 gallons. The new one will hold 60,000,000 gallons. The water in the higher or new reservoir can be passed through the old reservoir and then to the distributing system, or it can be by-passed and piped directly to the city.

During the warm months there is some trouble with algæ growths. The water is passed through a chamber filled with gravel and wood charcoal.

Oneida's supply is of Group No. 2 quality.

Peekskill

The water supply is furnished by the municipality and is pumped from Peekskill Hollow creek. The creek drains Lakes Oscawana, Mohegan, Osceola and Nelson or Barge pond. The watershed covers eleven and one-half to twelve square miles and there are many opportunities for pollution around the lakes and along Peekskill Hollow creek and its branches.

There is a dam near the pumping station which impounds so little water that there is slight opportunity for effective sedimentation and improvement by storage.

The water is pumped to a reservoir holding 26,000,000 gallons, or eleven days' supply, and from there distribued to the consumers.

With the pollution abated and the watershed patroled and the water rules enforced, Peekskill's supply belongs in Group No. 2.

Piercefield

The water supply is furnished by the International Paper Company and is pumped from the Raquette river directly into the distributing system and compensating reservoirs.

The sewage from Tupper lake enters the river about five miles above Piercefield and there are a few sawmills on the river between Tupper lake and Piercefield.

This supply is questionable and belongs in Group No. 3.

Plattsburg

The water supply is furnished by the municipality and is obtained by gravity from surface streams and impounding reservoirs. There are two storage reservoirs, one holding 20,000,000 gallons and the other 4,000,000 gallons. About two miles from the city there are two distributing reservoirs holding 1,500,000 gallons each.

There is some pollution on the watershed and in the warm months there are algæ growths in the reservoirs.

The Plattsburg supply is of Group No. 2 quality.

Port Chester

The water supply is furnished by the Port Chester Water Works. The water is obtained from the supply of the Greenwich Water Company, located in the town of Greenwish, Conn. The source is gravity from brooks and storage reservoirs.

Putnam reservoir holds 3,000,000 gallons; Rockwood reservoir, 7,000,000 gallons; Piping brook reservoir, 11,000,000 gallons.

All the water is filtered through mechanical pressure filters. The old and small filters are Hyatt filters. The new filters are of the horizontal pressure type.

The filters are operated by gravity, being located on the pipe line leading from the storage reservoir to the distributing system.

Port Chester has a Group No. 2 supply.

Potsdam

The water supply is furnished by the municipality and is pumped by water power. The intake is near the dam across the river in the village.

The water carries considerable color and pollution from the mills on the watershed.

Potsdam's supply is hardly of Group No. 2 quality.

Poughkeepsie

The water supply is furnished by the municipality and is obtained from the Hudson river. Since the early winter of 1907, the water has been pumped to a sedimentation basin with vertical baffle walls and sufficient capacity to hold about twenty-four hours' supply. A coagulant is added to the water while it is being forced into the sedimentation basin, and in the basin the water has an opportunity to coagulate and the heavier particles also settle out.

From the sedimentation basin the water is passed on to slow sand filters. There are four units of concrete construction and the filters are covered. The filtered water passes into a pure-water basin and is then pumped to the distributing reservoir, which is uncovered and has a capacity of 12,000,000 gallons.

About 2,500,000 gallons a day are filtered.

The filters as now operated make Poughkeepsie's supply of Group No. 2 quality.

Rensselaer

The water supply is furnished by Rensselaer Water Company d is pumped from the Hudson river to a filter plant.

The filters are of the Jewell high-gravity type. There are six its of a nominal capacity of 500,000 gallons each.

The coagulant is fed by gravity directly into the water as it eing pumped to the filters. The quantity of coagulant added is ıtrolled by an orifice. The head on the orifice is regulated by loat valve.

The water with the coagulant added passes to the settling tanks der each filter tank and from there passes on to the filter.

The rate of filtration is controlled by Weston controllers on effluent pipe of each filter unit. The effluents pass to a con-ete pure-water basin built under the filters. The water from is basin is pumped into the distributing system and to a stand-pe holding 294,000 gallons.

With the filters properly operated, Rensselaer's supply is of oup No. 2 quality.

Richfield Springs

The water supply is furnished by the municipality. Water is tained from Allen lake. The surroundings are fairly good, ough there are some farms on the watershed, and on the imme-ate bank of the lake some of the land is used for pasturing ttle. The village owns but a small part of the lake shore.

The water is pumped over a mile to a reservoir holding about 000,000 gallons of water. Ordinarily this reservoir supplies le filters, but there is another reservoir at about eight feet lower evation that can be used and is used in emergencies, such as in se of a large fire or while cleaning the other reservoir. A trench rrounding this reservoir carries off the surface drainage ordi-rily, but in times of heavy storms or thaws the water can enter reservoir from this ditch. In fact there is a pipe in the bank this reservoir which would indicate that this drainage is in-tionally caught at times. The pipe lies well above the normal ter level of the reservoir.

The water from the reservoir is filtered through two Hyatt ssure filters, vertical steel tanks, eight feet in diameter.

Above the strainers is about one foot of gravel, which varies in

size from about three-eighths inch to three-sixteenths inch diameter. Above the gravel is four and one-half feet of sand, the grains being quite uniform and of about fifty millimeters effective size.

Originally there were alum feeds, but at the time of the inspection no alum was used nor had any been used for some time.

This supply is of Group No. 2 quality.

Rome

The water supply is furnished by the municipality and is obtained from the Mohawk river. The watershed extends to Boonville, a distance of about twenty-five miles. There are some opportunities for pollution by the water overflowing from the Black River canal.

The city has made arrangements to procure a new source of supply by gravity from Fish creek.

Rome's present supply is questionable and is but little above the Group No. 3 standard.

Saratoga Springs

The water supply is furnished by the municipality and is obtained from Loughberry lake and its tributaries. The watershed is limited in area and there are but few people on its drainage area. The soil is fine sand, well adapted to take care of subsurface pollution from privies, etc. At times during the warmer months there are complaints of tastes and odors caused by algæ growths.

This supply is Group No. 1 quality.

Scotia

The water supply is furnished by the municipality and is obtained from seven driven wells and pumped to a standpipe. The water is somewhat hard, but otherwise of good sanitary quality.

This supply is of Group No. 1 quality.

Slingerlands

The water supply is furnished by the Suburban Water Company and is obtained by gravity from springs at the foot of the Helderberg mountains. The water is distributed from the springs and the excess flows into a storage reservoir. The greater part of the year the springs furnish sufficient water to supply the d

and, and as the head is greater from the springs than at the reservoir the consumers seldom get water from the reservoir, but during droughts the springs are not able to supply the demand nd then the water from the storage reservoir has to supplement he springs. There are some shallow reaches in the storage reservoir and this gives opportunity for algæ growths which occasionlly produce tastes and odors, causing complaints from consumers.

Tarrytown

The water supply is furnished by the municipality. Water is btained from the Tarrytown lakes, lying to the south of Pocanco Hills. The lakes are formed by damming up a valley where eviously there were driven wells.

They cover a considerable area, and during the drought of last mmer the water level was lowered only two inches.

The water probably comes mostly from springs in the gravel, as ere are no permanent streams of any size entering the lakes.

The water from the lakes is filtered through pressure filters, five ı number. There is a separate high and low pressure service.

The filters are of the horizontal type, about eight feet in iameter, and of 500,000 gallons capacity. Crystallized alum is sed and is fed through one of the typical tanks used with pressure lters. The water dissolves the alum as is passes through these nks and this alum solution mixes with the water entering the ters. The filters are washed with water from the standpipe d not directly from the pump. The raw water is probably but ghtly polluted as the drainage area is limited so far as surface sh is concerned.

The whole plant is well appointed and maintained, and undoubtly better operated than most plants of this type, though the pe is not capable of the highest uniform efficiency.

The raw water already being of fair quality this supply is assed in Group No. 1.

Ticonderoga

The water supply is furnished by the municipality. There are o sources. One, the Chilton supply, obtained by gravity; this pply is of fair quality but inadequate in amount. The other pply is derived from Lake George outlet, and there are reasons

to believe that water from this source caused an outbreak of typhoid about one year ago, as part of the village of Ticonderoga lies not far from the water works intakes. Part of the village is supplied by gravity from the lake outlet and part is supplied by pumping from the same source. There is available a gravity supply from Gooseneck pond of good sanitary quality, if the cost of construction of a pipe line is not prohibitive.

The Chilton supply is of Group No. 1. The Lake George supply is questionable.

Waterford

The water supply is furnished by the Waterford Water Works Company.

The water is obtained, by pumping, from the Hudson river above the village near Ford's mill. The water is pumped to the distributing system and the two standpipes which hold about 300,000 gallons each.

The water is untreated in any way and carries the pollution of the upper Hudson watershed above Waterford.

Analyses made by the Department show that bacilli of the B. coli type are persistently present in inoculations of one cubic centimeter each and frequently present in the inoculations of one-tenth of a cubic centimeter of the water.

Such persistent presence of the B. coli type places the water in the questionable class as a potable water.

This supply belongs in Group No. 3.

Watervliet

The water supply is furnished by the Watervliet Hydraulic Company. The water is obtained by pumping from the Mohawk river at Dunsbach Ferry and is forced through a main into two sedimentation basins located near Stop No. 41 on the Troy division of the Schenectady trolley line. One of these basins is about 175 feet long by 200 feet wide and the other is about 200 feet wide by 275 feet long. The settled water from these basins flows into another basin designated a filter, about 135 feet wide and 395 feet long. This filter basin surrounds another smaller basin in the center about 20 feet wide and 20 feet long and about 22 feet deep, and this serves as the pure water well. The area

l within the banks of the filter basin and the outside walls
ure water well is the filter and is filled with stones of dif-
izes (graded), and a thin bed of sand above the stones and
·el. Along the bottom of the walls of the pure water well
ıings which allow the water that has filtered through the
d gravel to pass into the pure water well, and from here it
buted by gravity.
ɔnly control of the rate of filtration is the consumption of
which, of course, varies the head between the sedimenta-
ın water level and the level of the water in the pure water
l rate of filtration responds to the variations in head.
rvliet's supply is of Group No. 3.

White Plains

water supply is furnished by the municipality and is ob-
rom storage reservoirs and dug wells.
storage reservoirs obtain the water from small brooks lying
st of the town. The old reservoir, having a capacity of
)00 gallons, was built in 1900. The second reservoir, hold-
,000,000 gallons, was bulit in 1906.
e valley below the reservoirs are 6 wells, about 25 feet deep
feet in diameter.
wells supply about 500,000 gallons daily in the dry season
),000 gallons in the wet season.
intersept the seepage from the reservoirs and are located
ımpy location.
he water distributed to the consumers is pumped. The
daily consumption is about 1,000,000 gallons.
ng the year 1907 some water was purchased from New
ty and came from the Kensico reservoir.
supply belongs in Group No. 2.

Yonkers

water supply is furnished by the municipality. There are
istinct sources of supply, a gravity supply, a driven well
and a filtered water supply from the Sawmill river.
driven wells are fourteen in number and about thirty-five
p and yield about 1,250,000 gallons.

The dam at the impounding reservoir has recently been raised and the reservoir will impound about 900,000,000 gallons of water.

The filters are situated along the Sawmill river and this water flows on to them by gravity. The present plant consists of two units of the slow sand type, each being one-half acre in area. There are at the present time building two more filters of the slow sand type, just north of the old filters. These will be three-fourths of an acre each and will be covered.

The flow of the Sawmill river at times will not be much greater than the capacity of the filters, and it is the intention of the authorities to use the filters when the river is carrying a considerable volume of water and conserve the gravity supply, and to draw on the gravity supply when the flow of the Sawmill is limited.

The old filters were designed by Mr. Allen Hazen and the new plant is designed by Hazen & Whipple.

The well water is hard.

The gravity supply comes from the Sprain and Grassy Sprain river watersheds.

This supply is of Group No. 2 quality.

Table I shows the results of the chemical and bacteriological examinations of samples of water obtained from the foregoing public water supplies. The chemical analyses have been conducted according to the standard methods advised by the committee on standard methods of water analysis of the Laboratory section of the American Public Health Association.* The bacteriological examinations have likewise been carried out in general by the use of the methods recommended by the above committee. As some deviation has been made from the standard methods recommended by this committee for this part of the work, I am inserting the following general description of our methods:

The bacteria counts on samples were made from cultures grown on standard gelatin for forty-eight hours at 20° C. In making tests for the presence of bacilli of the B. coli type, varying quantities of the sample have been inoculated into Jackson's bile media or dextrose broth in fermentation tubes; that is 10

*Report of the American Public Health Association, Vol. 31, Part 2. Also Journal of Infectious Diseases, Supplement 1, May, 1905.

The public water supply comes from Cromwell lake. The water near the intake seems comparatively shallow and the intake is evidently not far from shore. The water passes through a small area filled with gravel or wood charcoal; this charcoal I was informed is renewed occasionally. I would infer that at times there is trouble from algae and this strainer is probably an attempt to remedy this difficulty.

Pollution from some of the places comparatively near the lake would probably be indirect for the following reasons:

At one time there was a water power on the stream that is the natural outlet from the lake, and when this dam was in place an area was flooded which is now a swamp, with the water in this swamp normally about two feet lower than the lake level, the lake being cut off by means of a dike in which there is a sluice gate. The intake for the water supply could hardly be much nearer this sluice.

Normally the seepage would be toward the swamp from the lake though at times, I was told the water level in the swamp reaches that of the lake, though this has not occurred recently.

The sewage from some of the places drains into this swamp. One of these places (Henry Brummer's), a place that is open the whole year, apparently for entertainment rather than as a boarding-house, is about 200 feet from the lake and on ground but a few feet higher than the lake level. The sewage from this place is lead in a direction away from the lake into a cesspool about 8 feet deep, and from this cesspool through drains about 200 feet long, reaches the swamp area.

This is the nearest public building to the lake shore. A gentlemen's toilet belonging to these premises is not over 100 feet from the lake shore, and near the channel of the sluice connecting swamp and lake.

The sewage from a summer hotel and cottages (Hill Crest) reaches the swamp area in the following manner:

The hotel and cottages stand upon a hill about 300 feet above the lake level and 600 or 700 feet from it. This place accomodates about 200 people during the height of the season. They pump their own water from the lake and their sewage enters the swamp area in the following manner:

TABLE I.

RESULTS IN PARTS PER MILLION.

CITY, TOWN OR VILLAGE	Source.	Date, 1907.	Color.	Turbidity.	Residue on evaporation.	Nitrogen as				Chlorine.	Hardness. Total.	Oxygen consumed (30-minute test.)	Bacteria per c. c.	B Coli Type. (+=Present.) (—=Absent.)		
						Free Ammonia.	Albuminoid Ammonia.	Nitrites.	Nitrates.					10 c.c.	1 c.c.	$\frac{1}{10}$ c.c.
Albion	Pond on Otter creek	Aug. 12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	24,000	+	+	—
Albion	Tap, village supply	Aug. 12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	80	—	—	.....
Albion	Pond on Otter creek	Sept. 21	28	20	350	.084	.526	Trace	0.0	10.25	239.	13.60	21,000	....	+	+
Albion	Tap, village supply	Sept. 21	0.0	12	307	.002	.104	.010	1.00	14.75	177.5	2.30	12,000	+	+	.....
Amsterdam	Tap, city supply	July 19	50	10	75	.016	.202	.001	0.0	1.00	36.4	9.20	350	+	+	.....
Amsterdam	Tap, city supply	Sept. 10	48	18	83	.020	.194	Trace	0.06	0.37	34.5	10.60	1,100	+	+	—
Ardsley	See Dobbs Ferry															
Avon	Tap, village supply	Dec. 13	2	0.0	179	.012	.412	Trace	0.01	20.00	111.4	3.35	500	—	—	.....
Ballston Spa	Tap, village supply	July 17	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	250	—	—	.....
Canstota	Tap, village supply	Aug. 14	0.0	25	985	.016	.118	.002	0.18	3.75	485.5	2.20	3,600	+	+	—
Cape Vincent	St. Lawrence R. mouth of drain at Woodruff street	June 11	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	390,000	....	+	—
Cape Vincent	St. Lawrence river, near Woodruff's cesspool	June 11	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	160	+	+	—
Cape Vincent	St. Lawrence river, mouth of drain at James and Essex streets	June 11	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	51,000	+	+	+
Cape Vincent	St. Lawrence river, intake, village supply	June 11	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	9	—	—	—
Cape Vincent	Tap, village supply	Aug. 31	....	....	....	....	....	....	....	7.00	....	.....	1,500	—	—	.....
Carthage	Tap, village supply	Aug. 31	30	3	75	.014	.154	.001	0.04	0.50	24.7	14.30	300	+	—	.....
Carthage	Indian river, proposed new supply	Sept. 18	0.0	0.0	53	.002	.042	Trace	0.80	0.25	19.5	0.80	.....	....	.....	.....
Catskill	Tap in pumping station	July 27	30	8	146	.068	.176	.025	0.14	4.00	67.1	11.80	1,200	....	+	+
Catskill	Tap, village supply	July 27	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	550	....	+	—
Clayton	St. Lawrence river, railroad's independent supply	Aug. 30	....	....	....	....	....	....	....	....	....	....	9,500	....	+	.....
Clayton	St. Lawrence river tap, village supply	Aug. 30	0.0	0.0	170	.008	.090	.001	.010	6.50	97.2	1.65	950	+	+	.....
Clayton	Tap in pumping station	Sept. 7	....	....	....	....	....	....	....	....	....	....	900	....	—	.....
Cohoes	Tap in pumping station	July 15	21	.....	171	.084	.194	.003	.210	3 90	88.0	7.40	2,400	....	+	+
Cohoes	Tap in pumping station	Aug. 7	18	5	181	.026	.160	.006	.180	5 00	105 8	7.90	.....	....	+	+
Cohoes	Tap in pumping station	Aug. 15	27	2	188	.022	.190	.008	3 06	5 00	100 0	10 20	1,800	....	+	+

five degrees, the short distance of about 250 feet horizontally directly into the lake, and this point is but a few hundred feet from the village water supply intake.

On the same property is a laundry building built on the lake shore and its waste water also enters the lake. Mrs. Thomas C. Platt has a cottage near the lake and there is another newly built property across the lake from the Cromwell and Platt properties.

There is a building back of the Brummer property with cesspools, this building is 300 or more feet from the lake shore.

The condition of the water shed of the lake makes pollutions possible, some directly and some indirectly.

The striking feature is the fact that the typhoid epidemic if it is water-borne, occurred at a time of the year when the most probable sources of pollution were occupied by the caretakers and their families only.

The formation upon which the different hotels and houses around the lake are built is locally called hard pan (probably a conglomerate or pudding stone). It lies very close to the surface and the little soil covering it is not very pervious. The difficulty of excavating tends toward make-shift shallow cesspools, and the pipes leading to or from some of the same seem to be blind ditches just below the surface. Such shallow arrangements are possible because they are used generally in the summer when frost does not interfere.

The grades are such that it is possible to make more effective provision for the disposal of sewage; and such provision should be made.

The Department made rules in August, 1903 for the protection of the watershed, but these rules are evidently not enforced. From the evidence at present available the epidemic would seem to be water-borne and the conditions of the watershed around the lake makes such an infection possible, although the time of year in which the epidemic occurred does not coincide with the time of the year when the population on the watershed is largest.

Yours sincerely,

LEONARD M. WACHTER,
Sanitary Chemist

RESULTS IN PARTS PER MILLION —(*Continued*).

CITY, TOWN OR VILLAGE	Source.	Date, 1907.	Color.	Turbidity.	Residue on evaporation.	Nitrogen as: Free Ammonia.	Nitrogen as: Albuminoid ammonia.	Nitrogen as: Nitrites.	Nitrogen as: Nitrates.	Chlorine.	Hardness. Total.	Oxygen consumed (30-minute test.)	Bacteria per c. c.	B Coli Type. (+=Present.) (—=Absent.): 10 c.c.	1 c.c.	1/10 c.c.
Kingston	City supply, filter effluent	July 26	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,300	—	—	.....
Kingston	Tap, city supply	July 27	0.0	0.0	37	.004	.032	Trace	0.08	1.50	.....	0.95	.....	....	....	.....
Kingston	Cooper's lake, city water reserve	Aug. 12	0.0	5	36	.038	.174	Trace	0.0	1.87	17.5	2.85	.....	....	....	.....
Little Falls	By-wash, carrying surface drainage around reservoir	Aug. 5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,300	+	+	.....
Little Falls	Tap, city supply	Aug. 5	22	20	145	.018	.150	Trace	0.08	0.25	102	6.50	8,300	+	+	—
Little Falls	Beaver reservoir	Oct. 2	5	0.0	152	.002	.076	Trace	0.16	0.50	120	2.50	19,000	+	+	+
Little Falls	Stream flowing into reservoir	Oct. 4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	74,000	+	+	+
Little Falls	Tap, city supply	Oct. 4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	15,500	+	+	+
Little Falls	Spruce Creek reservoir	Oct. 2	95	3	81	.018	.242	Trace	0.06	0.75	24.7	16.20	.....	....	....	.....
Lockport	Tap, city supply	Dec. 5	12	30	260	.174	.236	.015	0.20	11.25	151.4	4.20	56,000	+	+	—
Matteawan	Village supply, Matteawan State Hospital	July 25	0.0	.....	45	.008	.064	Trace	0.0	2.00	22.7	1.50	65,000	—	—	—
Matteawan	Fishkill-on-Hudson water supply	Aug. 22	0.0	3	42	.010	.056	Trace	0.04	1.75	14.3	2.00	20,000	+	—	—
Massena	Tap, village supply	Aug. 28	0.0	4	192	.010	.074	Trace	0.0	6.87	100	1.50	600	+	—	—
Mechanicville	Plum Brook	Sept. 4	13	4	201	.008	.084	.002	0.0	1.50	142.8	2.90	1,600	+	—	.....
Mechanicville	Baker Brook	Sept. 4	0.0	0.0	259	.002	.004	0.0	0.04	1.25	174.2	0.20	475	+	—	.....
Mt. Morris	School building tap; unused during vacation	Sept. 6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	*	—	—	.....
Mt. Morris	Reservoir	Sept. 6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	45,000	+	—	.....
Mt. Morris	Last collecting well	Dec. 8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	270	+	—	—
Mt. Morris	Sheldon pond	Dec. 8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	220	+	—	—
Mt. Vernon	Mamaroneck river	Dec. 17	5	8	92	.048	.102	.005	0.90	5.50	42.3	2.30	5,600	+	+	.....
Mt. Vernon	City supply, filtered	Dec. 17	2	0.0	95	.038	.066	.002	0.80	5.75	40.3	0.75	120	+	—	.....
Mt. Vernon	Tap, city supply	Dec. 17	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,800	+	—	.....
Newark	State asylum; well at Wilder House	Sept. 28	0.0	5	434	Trace	.116	.001	0.80	9.75	314.5	1.30	18,000	...	+	+
Newark	Well —Custodial asylum	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	52,000	+	+	+
Newark	Brick well, public water supply	Oct. 12	0.0	1	438	.006	.058	.001	6.40	7.80	307	3.80	55,000	—	—	—
Newark	Reservoir	Oct. 12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,200	+	+	—
Newark	Pipe leading into brick well from west	Oct. 31	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	400	....	+	—
Newark	Pipe leading into brick well from east	Oct. 31	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,100	...	—	+
Newark	Standpipe	Oct. 31	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100	+	—	—

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Niagara Falls	Niagara Falls Water Works Co. effluent filter No. 1	Dec. 3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	30,000	....	+	.....
Niagara Falls	Niagara Falls Water Works Co. effluent filter No. 9	Dec. 3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	25,000	....	+	.....
Niagara Falls	Raw water intake, outside of screen	Dec 3	1	17	163	.038	.126	.002	0.02	7.37	104.2	2.30	51,000	....	+	+
Niagara Falls	Mixed effluents, filters Nos. 1 and 9	Dec. 3	1	0.0	146	.026	.088	.010	0.04	7.37	112.8	1.65	.....	....	....	.....
Niagara Falls	Pumping station, city plant	Dec 9	1	35	221	.086	.226	.005	0.04	7.37	105.8	3.30	11,500	+	+	—
North Tarrytown	See Dobbs Ferry.															
Ogdensburg	Tap, city supply	Aug. 29	41	4	73	.010	.166	Trace	0.0	0.75	24.7	16.50	600	+	—	—
Ogdensburg	Tap, city supply	Sept. 23	45	15	87	.008	.234	Trace	0.04	0.50	27.3	17.20	11,500	+	+	—
Ogdensburg	Oswegatchie river at intake	Oct. 2	45	5	79	.018	.224	Trace	0.0	0.87	26.0	20.00	550	+	+	+
Ogdensburg	Oswegatchie river, proposed intake	Oct. 2	55	5	75	.018	.168	Trace	0.0	0.83	26.0	19.60	190	+	+	+
Ogdensburg	Oswegatchie river, near N. Y. C. R. R. bridge, above city	Nov. 6	52	5	93	.006	.193	Trace	0.04	0.37	37.8	23.40	3,100	....	+	—
Ogdensburg	Oswegatchie river, proposed intake	Nov. 6	40	5	92	.006	.224	.001	0.04	0.37	43.6	22.00	3,500	....	+	—
Ogdensburg	Oswegatchie river, present intake	Nov. 6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4,300	....	+	—
Ogdensburg	St. Lawrence river, opposite west city limits	Dec. 4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	190	+	—	—
Ogdensburg	Cornell well	Dec. 4	1	5	327	.108	.060	Trace	0.0	4.87	250	0.40	41,500	—	—	.....
Ogdensburg	Cold Springs on Lake street	Dec. 4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100	....	—	—
Oneida	Tap, city supply	Aug. 14	13	25	995	.212	.202	.006	0.0	10.75	468	4.90	26,000	+	+	—
Peekskill	Tap, village supply	Nov. 18	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,200	+	—	—
Peekskill	Tap, village supply	Nov. 25	20	2	65	.002	.118	Trace	0.08	2.25	31.2	5.30	300	+	+	+
Piercefield	Tap, town supply	July 25	37	5	35	.026	.154	Trace	0.0	0.80	11.1	7.85	1 200	+	+	—
Piercefield	Tap, town supply	July 25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3 900	+	+	—
Piercefield	Tap, town supply	Sept. 28	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	10 500	+	+	+
Piercefield	Stream from springs, possible new supply	Sept. 27	18	1	55	.008	.110	Trace	0.06	0.62	20.8	4.10	18,500	+	+	+
Plattsburg	City supply—air vent in main	Aug. 27	0.0	0.0	129	.016	.054	Trace	0.06	0.62	111.4	1.55	2,200	+	—	.....
Port Chester	Tap, village supply	Dec. 18	12	2	61	.030	.086	Trace	0.16	3.12	21.4	4.40	300	+	—	.....
Potsdam	Tap, village supply	Aug. 28	40	2	78	.004	.162	Trace	0.0	0.25	19.5	14.50	1,300	+	—	—
Poughkeepsie	Filter plant, raw water	Feb. 20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4,850	....	+	.....
Poughkeepsie	Filter No. 1	Feb. 20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	150	....	+	.....
Poughkeepsie	Filter No. 2	Feb. 20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,350	....	+	.....
Poughkeepsie	Filter No. 3	Feb. 20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	205	....	+	.....
Poughkeepsie	Filter No. 4	Feb. 20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	95	....	+	.....
Poughkeepsie	Raw water basin (old)	Dec. 24	20	50	149	.032	.154	.002	0.24	1.80	44.3	8.80	130,000	+	+	+
Poughkeepsie	Clear water basin	Dec. 24	18	8	100	.012	.084	Trace	0.30	1.37	44.3	5.45	.....	....	....	.....
Poughkeepsie	Filter No. 2	Dec. 24	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	275	+	+	.....
Poughkeepsie	Filter No. 3	Dec. 24	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	425	+	+	.....
Poughkeepsie	Filter No. 4	Dec. 24	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	425	+	+	.....
Poughkeepsie	Vassar College. Pump in Administration building	Dec. 24	2	0.0	185	.012	.092	Trace	2.00	8.12	105.8	0.35	13	—	—	.....

* Too numerous to count.

RESULTS IN PARTS PER MILLION — (*Concluded.*)

CITY, TOWN OR VILLAGE	Source.	Date, 1907.	Color.	Turbidity.	Residue on evaporation.	Nitrogen as—				Chlorine.	Hardness. Total.	Oxygen consumed (30-minute test.)	Bacteria per c. c.	B Coli Type. (+=Present.) (—=Absent.)		
						Free ammonia.	Albuminoid ammonia.	Nitrites.	Nitrates.					10 c.c.	1 c.c.	1/10 c.c.
Poughkeepsie	Vassar College. Tap in north wall	Dec. 24	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	450	—	—	.....
Rensselaer	Hudson river, raw water	May 22	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	6,200	+	+	.....
Rensselaer	Tap, city supply	May 22	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	65	+	—	.....
Rensselaer	Tap, city supply	May 22	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	44	+	+	.....
Rensselaer	Filter plant, unit No. 2	May 22	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	48	+	—	.....
Rensselaer	Filter plant, unit No. 4	May 22	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	60	+	—	.....
Rensselaer	Filter plant, unit No. 5	May 22	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	33	+	—	.....
Rensselaer	Hudson river, raw water	June 14	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	6,000	.....	+	+
Rensselaer	Tap, city supply	June 14	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	80	+	+	.....
Rensselaer	Tap, city supply	June 14	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100	+	+	.....
Rensselaer	Hudson river, raw water	July 18	38	.....	.....	.080	.250	.016	0.0	3.30	74.3	14.60	2,000	+	+	+
Rensselaer	Filter plant, unit 3	July 18	0.0	.....	.....	.056	.084	.016	0.0	3.20	74.3	8.30	11	+	+	+
Rensselaer	Filter plant, unit 2	July 18	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	16	+	+	+
Rensselaer	Filter plant, unit 1	July 18	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	—	+	+	+
Rensselaer	Hudson river, raw water	Sept. 17	40	8	119	.024	.244	.012	0.0	1.87	51.4	16.50	12,000	.....	+	+
Rensselaer	Filter plant, unit 3	Sept. 17	00.0	0.0	113	.008	.112	.008	0.06	1.87	51.3	7.90	372	.....	+	—
Rensselaer	Filter plant, unit 2	Sept. 17	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	215	.....	+	—
Rensselaer	Filter plant, unit 1	Sept. 17	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	212	.....	+	—
Rensselaer	Hudson river, raw water	Oct. 14	38	20	100	.018	.206	.003	0.08	1.82	49.3	15.40	33,000	.....	+	+
Rensselaer	Filter plant, unit 6	Oct. 14	0.0	3.0	92	.006	.082	.003	0.08	1.82	51.4	5.20	.....	.....	.....	.....
Rensselaer	Filter plant, unit 1	Oct. 14	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,100	.....	+	—
Rensselaer	Filter plant, unit 2	Oct. 14	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3,000	.....	+	—
Rensselaer	Filter plant, unit 3	Oct. 14	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4,800	.....	—	—
Rensselaer	Hudson river, raw water	Nov. 25	17	17	111	.046	.208	.009	0.10	2.12	—	16.40	55,000	.....	+	+
Rensselaer	Filter plant, unit 6	Nov. 25	2	5	106	.038	.126	.005	0.10	2.12	—	13.30	5,700	+	+	.....
Rensselaer	Filter plant, unit 5	Nov. 25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4,800	+	+	.....
Rensselaer	Filter plant, unit 1	Nov. 25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4,000	+	+	.....
Richfield Springs	Pump main, village supply	Aug. 15	12	1	102	.014	.216	Trace	0.0	0.25	59.3	5.00	300	+	+	.....
Richfield Springs	Pipe-feeding filters with raw water	Aug. 15	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	240	+	+	.....
Richfield Springs	Filter No. 1 (nearest village)	Aug. 15	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	450	+	+	.....
Richfield Springs	Filter No. 2	Aug. 15	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	140	+	+	.....
Richfield Springs	Stream, source of ice supply, 5 miles above dam	Aug. 19	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	17,500	+	+	—

ALBANY, N. Y., *June* 20, 1907.

Mr. FRANK HARDING, *Superintendent, Central Valley & Highland Mills Water Company, Middletown, N. Y.*

DEAR SIR: — I have your communication of June 19 and note that it is the purpose of your company to comply with the order recently served upon you to make such an inspection as the order provides for with as little delay as possible.

The Department wishes to make only such requirements regarding this inspection as are reasonable and I would suggest that you make a report of the inspection within fifteen days from the time the order was received by you. If it is necessary for you to have a few days more time in order to complete the inspection, if you will advise me giving the reasons, it may be possible to extend the time. I would suggest that when the inspection is completed it might be advisable for you to come to Albany so that we could go over the matter together. I will be very glad to take it up and will be pleased to make an appointment with you here at any time.

Very respectfully,

EUGENE H. PORTER,
Commissioner of Health

MIDDLETOWN, N. Y., *June* 29, 1907.

EUGENE H. PORTER, M. D., *Commissioner, State Department of Health, Albany, N. Y.*

DEAR SIR:— Referring again to our correspondence, beginning with your letter of the 17th inst., inclosing your order of the 15th, "in the matter of the enforcement of certain rules" etc., in connection with the watershed from which this company derives its supply. I beg to say that in pursuance of the outline in mine of the 19th, we have been successful in securing an impartial examination and report, by the party I hoped to secure for that purpose, and have further had the valuable aid of another of much experience and exceptional skill. It is believed that the conclusions arrived at are exact beyond dispute, and are also complete.

In order to be within the time limit named in your order I am inclosing herewith report of examination made (under instruc-

Besides these systematic examinations of public water supplies, the laboratory has analyzed chemically or bacteriologically 539 samples of water, which were collected from wells or other sources of potable water, concerning which there was considerable suspicion of pollution and which involved sanitary problems of a more or less public character. This number also includes examinations made on samples collected by members of the Division of Sanitary Engineering, or by members of the laboratory staff assisting the Sanitary Engineering Division, in the investigation of the pollution of the upper Hudson, the pollution of the DeGrasse river, the sanitary survey of the Oswego watershed, the sanitary investigation of the Niagara river, the investigation of the supplies in ice houses on the Hudson river in the vicinity of Albany, and in the extensive investigation of the ice supplies of the entire Hudson valley district. The details of this work will be found in the report of the Division of Sanitary Engineering.

INVESTIGATION OF SEWAGE DISPOSAL PLANTS

Although plans were formulated for the systematic examination for the efficiency of some, at least, of the sewage disposal plants located in various parts of the State, on account of lack of funds it was possible to undertake only the investigation of one plant, namely, the sewage disposal plant of Saratoga Springs. Even this work could not be continued after July 1, 1907, because of lack of means. The following is the final report upon the investigation made at Saratoga:

Sewage Experiment Station at Saratoga

The State Hygienic Laboratory with the co-operation of the local board of sewer and water commissioners maintained a laboratory at the sewage disposal plant at Saratoga during part of 1906 and 1907.

Considerable time was occupied in arranging and equipping the laboratory. Regular analyses of the sewage in the different stages of the process of purification were made from January until the latter part of June, 1907.

During January and up to March 1, 1907, conditions were not normal at the plant, and it would not be well to draw any conclusions from the analytical data obtained during this interval. The results from March 1st until the laboratory work was discontinued represent normal working conditions for the period of the year included, but it would be desirable to have results obtained under normal conditions during the whole cold season and also during the period of maximum flow during July and August.

The system of purification used at Saratoga consists: First, of septic treatment in covered tanks; second, of aeration of the septic effluent; and last, of the final treatment by intermittent slow sand filtration.

The sewage of Saratoga is strictly domestic. But little storm water reaches the disposal plant, and there are little or no manufacturing wastes.

The normal population is about 13,000 people but during the summer months, particularly during August, the transients increase the population of Saratoga Springs to 60,000 or more.

These conditions necessitate a sewage disposal plant much larger than is generally considered sufficient for a municipality of about 15,000 population.

The heavy flow of sewage occurs in July and August when the temperature favors the best biologic conditions for disposal systems of the type in use at Saratoga, and for this reason the plant can more satisfactorily respond to heavy demands made upon it at these times. The increased acreage provided for the maximum amount of sewage makes it possible to operate the beds at a low rate during the remainder of the year.

The sewage is pumped from the village to the disposal plant through a 16-inch force main, about 8,800 feet long. There are three centrifugal pumps driven by electricity and which are started or stopped automatically by means of float arrangements, which by the aid of pulleys and chains operate the switches which control the electric current to the motors. The floats are set at different elevations and start one after the other as the height of sewage in the pump well rises. Should the flow of sewage

ing the week of July 8th I will be very glad to take up this matter with you, or if I am unable to be present my engineer will go over the matter with you. If you are able to come, will you kindly advise me what day you will be here.

Very respectfully,

EUGENE H. PORTER,
Commissioner of Health

Boonville

Numerous cases of typhoid fever having occurred at Boonville, the Department made an investigation.

The report of Dr. H. D. Pease, director of the State Hygienic Laboratory follows:

ALBANY, N. Y., *June* 5, 1907.

Dr. EUGENE H. PORTER, *State Commissioner of Health, Albany, N. Y.:*

DEAR DOCTOR: — In response to your instructions, I visited Boonville, Oneida county, on May 30th, and conferred with Dr. W. C. Roser, health officer of that village, regarding the outbreak of typhoid fever which occurred in that village during the last spring.

In all we were able to determine that six cases had occurred, but it is not improbable that other mild cases existed as well. The two earliest were taken ill about the middle of April, and occurred in father and daughter who lived in unhygienic surroundings; and while they drank their own well water, they had easy access to the village supply. The other cases developed April 27th, May 6th and May 22d respectively.

The cases were about evenly distributed between the two dairies supplying milk to the village. The Gerber dairy, located a short distance from the village, was found to be in a good sanitary condition. No member of the Gerber family had been ill, and there had been no case of typhoid fever in that part of the village in ten years. The Kinsbury dairy was located far out of town, and it was not considered necessary to inspect it as there is no evidence that it played any role in the transmission of the disease.

Considerable time was spent in going over the watersheds from

the sand filters, and is underdrained with farm tile laid in parallel rows. The different rows are all connected to a common conduit which carries that part of the effluents from the intermittent sand beds which reach the underdrain system, and it was intended that the tile underdrains would intercept the filtrate that would pass below the filter underdrain systems and so prevent a swampy condition in the field which lies at a lower level.

This arrangement makes it probable that samples designated "Taken at the manhole in the field" or samples "Taken at the R. R. track" would be mixed with more or less ground water.

The character of the filtering material available on the site, the good drainage obtainable because of the depth of sand above the ground watel level, and the fact that the sewage is domestic and free from trade wastes make the conditions almost ideal for a disposal plant of the intermittent type, and these facts should be considered when judging the results obtained, as there are but few places so fortunate in having such a combination of desirable factors that tend toward efficient operation.

The only measurement of the daily quantity of sewage treated at the disposal plant is the record of an automatic register which records the number of times the siphon in the dosing tank discharges. The amount of sewage distributed at each dose is about 35,000 gallons, and computing on this basis the amount of sewage handled during the period covered by the analyses was between 1,200,000 and 1,500,000 gallons daily.

Table No. 1 gives the results of the analyses of the raw sewage as it enters the septic tanks, and of the septic effluent as it leaves the tanks.

Table No. 2 gives the analyses of the mixed septic effluents as they leave the septic tanks and of the effluents from the intermittent sand filters.

The samples from which the results in tables No. 1 and No. 2 were obtained were composite samples, made up of small portions, taken twice daily, at different hours each day of the week except Sunday. They represent as well as it was possible to obtain it, a weekly average of the sewage delivered and passing through the plant during the working days from 9 A. M. to 5 P. M.

Table No. 3 gives the results of the chemical analysis of the

final effluent as discharged into the natural water course. The samples represent the effluents of the intermittent sand filters mixed with ground water, coming from the tile drained field below the filter beds.

Table No. 4 gives the results obtained from composite samples made up of equal portions, taken at intervals of an hour.

No effort was made to adjust the amount of the hourly fractions so as to proportion them to the volume of sewage reaching the plant during any given hour.

The first figures refer to the mixture of individual portions collected each hour during the whole twenty-four, from 12 o'clock noon of one day until 12 o'clock noon of the day following.

The second line refers to a mixture of the hourly portions obtained between 6 A. M. and 6 P. M.

The third line of figures refers to a mixture of the hourly portions obtained from 6 P. M. until 6 A. M.

Table No. 5 gives the chlorine content (results in parts per million) in samples of the sewage as delivered to the disposal plant, taken each hour for twenty-four hours, beginning at 12 o'clock noon May 24, 1907.

Table No. 6 gives the dissolved oxygen content of the septic effluent as the mixed effluent flowed to the aerator, and also of the mixed effluent after it had passed the aerator and flowed to the dosing tank.

The samples were taken by drawing the sewage, by means of a suction pump, through a small sample bottle into a bottle of five or six times the capacity of the sample bottle, so as to displace the sewage in the sample bottle several times.

The oxygen content was determined by the Winkler method.

The aerator at Saratoga consists of three perforated sheets of metal, arranged horizontally about a vertical central riser. The sewage flows from the septic tanks through the central riser and passes over the perforated plates in thin sheets.

TABLE A.— RESULTS OF THE CHEMICAL ANALYSES OF THE RAW SEWAGE ENTERING THE SEPTIC TANKS AND OF THE MIXED SEPTIC EFFLUENT.

DATE. 1907.	PARTS PER MILLION.															
	SOLIDS.			SUSPENDED SOLIDS.			ORGANIC NITROGEN.		NITROGEN AS —			OXYGEN CONSUMED.		Chlorine.	Dissolved oxygen.	Temperature. deg. F.
	Total.	Fixed.	Volatile.	Total.	Fixed.	Volatile.	Total.	In soln.	Free ammonia.	Nitrites.	Nitrates.	Total.	In soln.			
January 14	.....	.....	.....	62	.....	.....	22.5	18.	13.5	.....	.....	43.5	42.5	.....	.....	.....
January 18, 19	.....	.....	.....	93	5	88	22.5	20.	12.5	.08	0.72	61.5	46.	38.5	.....	.....
January 21-26	466	136	330	124	25	99	23.5	18.	16.5	.08	1.18	57.	39.	23.	7.3	.....
January 28-February 2	450	120	330	115	22	93	22.5	20.	14.	.08	1.04	58.5	46.5	42.	4.0	.....
January 30	.....	.....	.....	.....	.....	.....	27.0	22.5	20.	.08	1.16	45.5	25.	38.	4.3	.....
February 4-9	390	72	318	110	25	85	23.0	20.5	15.	.08	0.84	64.5	49.5	39.	4.2	.....
February 11-16	516	150	366	141	33	108	26.0	22.5	14.	.09	0.83	60.	47.	52.	.....	.....
February 18-23	490	150	340	113	19	94	28.5	22.5	14.	.07	1.09	62.	46.5	45.	.....	.....
March 11	620	198	422	140	25	115	28.5	24.	15.	.10	1.48	77.5	61.5	46.	.....	.....
March 11-16	488	156	332	104	15	89	24.0	20.5	13.	.10	1.30	69.5	55.5	79.5	.....	.....
March 21	476	150	326	105	25	80	19.5	17.0	7.5	.10	1.18	63.	46.5	36.	.....	41.
March 18-23	436	156	280	90	23	67	19.5	14.0	9.0	.10	1.34	59.	45.5	36.	4.5	40.1
March 25-30	510	170	340	106	30	76	27.5	21.0	11.0	.12	1.64	63.5	54.	45.	1.6	42.8
April 1-6	586	170	416	131	29	102	29.5	21.0	16.0	.16	1.64	69.	50.5	60.5	2.15	42.8
April 8-13	580	180	400	104	28	76	26.0	20.5	14.5	.20	1.40	61.	43.5	46.	2.10	43.7
April 15-20	570	160	410	118	25	93	27.0	22.5	14.5	.10	1.42	69.	37.5	51.	1.7	45.
April 22-27	610	150	460	133	18	115	26.0	20.5	13.5	.25	1.75	56.5	39.0	82.5	2.0	47.3
April 29-May 4	610	180	430	118	32	86	22.5	18.0	13.5	.20	1.52	65.	46.0	76.	1.0	47.3
May 6-11	558	174	384	112	25	87	26.0	20.0	15.	.12	1.59	63.5	45.	55.	0.0	50.9
May 13-18	694	200	494	134	39	95	27.5	21.5	17.5	.16	0.96	60.	45.5	85.	0.0	51.8
May 20-25	610	160	450	217	64	153	28.5	23.5	18.	.15	0.65	76.5	56.0	60.	0.0	51.8
May 27-June 1	716	196	520	214	60	154	32.0	26.	18.	.15	1.09	84.5	57.5	75.	0.0	52.7
June 5	506	126	380	83	19	64	21.5	18.	13.	.16	0.60	60.5	41.0	57.	.....	.....
June 3-8	638	180	458	175	36	139	29.0	24.5	18.5	.14	0.66	74.5	51.5	74.	0.0	55.4
June 10-15	764	216	548	.....	.....	.....	32.5	26.0	16.5	.18	0.66	90.	65.	82.	.....	.....

TABLE A.— RESULTS OF THE CHEMICAL ANALYSES OF THE RAW SEWAGE ENTERING THE SEPTIC TANKS AND OF THE MIXED SEPTIC EFFLUENT — (*Continued*).

DATE. 1907.	PARTS PER MILLION.															
	SOLIDS.			SUSPENDED SOLIDS.			ORGANIC NITROGEN.		NITROGEN AS —			OXYGEN CONSUMED.		Chlorine.	Dissolved oxygen	Temperature. deg. F.
	Total.	Fixed.	Volatile.	Total.	Fixed.	Volatile.	Total.	In soln.	Free ammonia.	Nitrites.	Nitrates.	Total.	In soln.			
January 14	.....	.....	.....	43	.....	.....	18.5	14.5	14.0	.....	.....	38.5	26.0	.....	.....	.....
January 18, 19	.....	.....	.....	40	15	25	22.5	19.0	14.5	.01	.19	34.0	24.0	45	.....	.....
January 21–26	400	140	260	60	4	56	20.0	18.5	16.0	.00	.00	37.0	25.5	40	0.0	.....
January 28–February 2	384	90	294	56	25	31	21.0	19.5	15.0	.00	.10	34.5	24.5	44	0.0	.....
February 4–9	374	96	278	54	8	46	21.0	19.0	16.5	.00	.24	38.0	28.0	42	0.0	.....
February 11–16	440	190	250	68	8	60	23.5	20.5	16.5	.02	.22	31.5	23.5	46	.....	.....
February 18–23	426	140	286	68	10	58	24.0	21.0	18.0	.03	.21	36.0	27.0	47	.....	.....
March 11	416	180	236	50	10	40	17.0	14.0	12.5	.09	.52	32.5	23.5	38	.....	.....
March 11–16	340	110	230	44	11	33	16.0	13.0	11.0	.10	.58	40.0	29.5	71	.....	.....
March 21	330	140	190	43	4	39	11.5	11.0	8.0	.12	.84	28.5	21.0	30	.....	40.1
March 18–23	300	100	200	39	9	30	12.5	10.5	9.5	.10	.82	28.5	24.5	31	2.8	40.1
March 25–30	370	160	210	35	12	23	14.5	13.3	9.0	.14	1.58	26.5	22.0	34	0.0	41.9
April 1–6	394	140	254	53	9	44	16.0	14.0	11.0	.16	.68	34.0	23.5	45	0.0	41.4
April 8–13	376	144	232	45	7	38	16.0	12.5	10.5	.24	.88	32.5	21.5	39	0.0	43.7
April 15–20	446	154	292	42	7	35	16.5	14.0	10.5	.13	.71	28.5	22.5	42	0.9	44.1
April 22–27	410	160	250	90	11	79	16.0	14.0	12.5	.20	.60	27.5	18.5	45	0.0	46.4
April 29–May 4	490	132	358	73	20	53	15.5	13.5	12.0	.17	.59	30.5	23.5	44	0.0	47.3
May 6–11	406	150	256	66	14	52	14.5	12.0	10.0	.02	.57	29.0	20.0	44	0.0	50.0
May 13–18	434	158	276	77	25	52	19.0	16.0	12.5	.00	.16	29.0	25.5	50	0.0	50.9
May 20–25	426	148	278	76	17	59	20.5	17.5	14.5	.02	.14	39.0	29.0	50	0.0	.....
May 27–June 1	436	156	280	88	28	60	20.0	17.5	15.0	.08	.20	43.0	21.5	50	0.0	52.7
June 3–8	460	164	296	90	22	68	21.5	17.5	15.5	.04	.08	45.0	26.0	51	0.0	57.2
June 10–15	.....	.....	.....	.....	.....	.....	21.0	18.0	15.0	.02	.10	44.0	36.5	60	.....	.....

DATE. 1907.	PARTS PER MILLION.														Temperature deg. F.
	SOLIDS.			SUSPENDED SOLIDS.			ORGANIC NITROGEN.		NITROGEN AS—			OXYGEN CONSUMED.		Chlorine.	Dissolved oxygen.	
	Total.	Fixed.	Volatile.	Total.	Fixed.	Volatile.	Total.	In soln.	Free ammonia.	Nitrites.	Nitrates.	Total.	In soln.			
January 14	.....	.....	.....	43	.....	.....	18.5	14.5	14.0	.....	.....	38.5	26.0	.....	.....	.....
January 18, 19	.....	.....	.....	40	15	25	22.5	19.0	14.5	.01	.19	34.0	24.0	45	.....	.....
January 21–26	400	140	260	60	4	56	20.0	18.5	16.0	.00	.00	37.0	25.5	40	0.0	.....
January 28–February 2	384	90	294	56	25	31	21.0	19.5	15.0	.00	.10	34.5	24.5	44	0.0	.....
February 4–9	374	96	278	54	8	46	21.0	19.0	16.5	.00	.24	38.0	28.0	42	0.0	.....
February 11–16	440	190	250	68	8	60	23.5	20.5	16.5	.02	.22	31.5	23.5	46	.....	.....
February 18–23	426	140	286	68	10	58	24.0	21.0	18.0	.03	.21	36.0	27.0	47	.....	.....
March 11	416	180	236	50	10	40	17.0	14.0	12.5	.09	.52	32.5	23.5	38	.....	.....
March 11–16	340	110	230	44	11	33	16.0	13.0	11.0	.10	.58	40.0	29.5	71	.....	.....
March 21	330	140	190	43	4	39	11.5	11.0	8.0	.12	.84	28.5	21.0	30	.....	40.1
March 18–23	300	100	200	39	9	30	12.5	10.5	9.5	.10	.82	28.5	24.5	31	2.8	.....
March 25–30	370	160	210	35	12	23	14.5	13.5	9.0	.14	1.58	26.5	22.0	34	0.0	41.9
April 1–6	394	140	254	53	9	44	16.0	14.0	11.0	.16	.68	34.0	23.5	45	0.0	41.9
April 8–13	376	144	232	45	7	38	16.0	12.5	10.5	.24	.88	32.5	21.5	39	0.0	43.7
April 15–20	446	154	292	42	7	35	16.5	14.0	10.5	.13	.71	28.5	22.5	42	0.9	44.1
April 22–27	410	160	250	90	11	79	16.0	14.0	12.5	.20	.60	27.5	18.5	45	0.0	46.4
April 29–May 4	490	132	358	73	20	53	15.5	13.5	12.0	.17	.59	30.5	23.5	44	0.0	47.3
May 6–11	406	150	256	66	14	52	14.5	12.0	10.0	.02	.57	29.0	20.0	44	0.0	50.0
May 13–18	434	158	276	77	25	52	19.0	16.0	12.5	.00	.16	29.0	25.5	50	0.0	50.9
May 20–25	426	148	278	76	17	59	20.5	17.5	14.5	.02	.14	39.0	29.0	50	0.0	.....
May 27–June 1	436	156	280	88	28	60	20.5	17.5	15.0	.08	.20	43.0	21.5	50	0.0	52.7
June 3–8	460	164	296	90	22	68	21.5	17.5	15.5	.04	.08	45.0	26.0	51	0.0	57.2
June 10–15	.....	.....	.....	.....	.....	.....	21.0	18.0	15.0	.02	.10	44.0	36.5	60	.....	.....

TABLE B.— RESULTS OF THE CHEMICAL ANALYSES OF THE MIXED SEPTIC EFFLUENTS AND OF THE INTERMITTENT SAND FILTERS — (*Continued*).

DATE. 1907.	PARTS PER MILLION.															Temperature deg. F.
	SOLIDS.			SUSPENDED SOLIDS.			ORGANIC NITROGEN.		NITROGEN AS—			OXYGEN CONSUMED.		Chlorine.	Dissolved oxygen.	
	Total.	Fixed.	Volatile.	Total.	Fixed.	Volatile.	Total.	In soln.	Free ammonia.	Nitrites.	Nitrates.	Total.	In soln.			
*January 14	.....	.....	.....	0.0	0.0	0.0	4.0	.....	3.0	.....	.....	11.5	11.5	.....	.....	.....
*January 18, 19	.....	.....	.....	0.0	0.0	0.0	5.0	5.0	3.0	0.0	3.0	19.0	19.0	42	7.8	.....
*January 21-26	434	220	214	0.0	0.0	0.0	5.5	5.5	3.0	.005	4.92	10.5	10.5	40.	8.1	.....
*January 28-February 2	340	150	190	0.0	0.0	0.0	8.5	8.5	7.0	.010	6.07	3.0	3.0	42.	.....	.....
*February 8	380	172	208	0.0	0.0	0.0	0.5	0.5	0.0	.001	5.96	1.5	1.5	45.	.....	.....
*February 11-16	390	170	220	0.0	0.0	0.0	0.5	0.5	.006	.001	5.00	0.0	0.0	42.	.....	.....
*February 18-23	520	240	280	0.0	0.0	0.0	0.5	0.5	.010	.001	7.00	0.0	0.0	45.	.....	.....
†March 11	370	150	220	0.0	0.0	0.0	7.0	7.0	7.0	.04	3.12	3.5	3.5	38.	.....	.....
†March 11-16	318	120	198	0.0	0.0	0.0	8.5	8.5	7.0	.04	3.24	4.0	4.0	75.5	.....	.....
†March 21	310	150	160	0.0	0.0	0.0	5.5	5.5	5.0	.03	3.73	3.0	3.0	35.	.....	37.9
†March 18-23	366	144	222	0.0	0.0	0.0	5.5	5.5	5.0	.03	4.21	2.0	2.0	37.	5.5	39.2
†March 25-30	400	160	240	0.0	0.0	0.0	5.5	5.5	5.0	.04	6.76	3.5	3.5	38.	.....	42.8
†April 1-6	416	174	242	0.0	0.0	0.0	3.5	3.5	3.0	.06	7.82	1.5	1.5	39.	3.5	42.4
†April 8-13	452	200	252	0.0	0.0	0.0	4.5	4.5	3.0	.10	10.26	2.5	2.5	38.	2.8	42.8
†April 15-20	460	200	260	0.0	0.0	0.0	3.5	3.5	2.0	.04	10.48	0.0	0.0	41.	5.6	43.7
†April 22-27	470	188	282	0.0	0.0	0.0	4.0	4.0	3.0	.10	9.50	1.0	1.0	41.	3.55	43.7
†April 29-May 4	474	222	252	0.0	0.0	0.0	2.5	2.5	2.0	.06	9.74	0.5	0.5	40.	4.5	44.1
†May 6-11	410	216	194	0.0	0.0	0.0	1.7	1.7	1.5	.05	11.03	4.0	4.0	40.	3.35	44.6
†May 13-18	514	234	280	0.0	0.0	0.0	1.5	1.5	1.2	.05	12.55	1.55	1.55	39.	4.20	50.0
†May 20-25	548	240	308	0.0	0.0	0.0	1.2	1.2	1.2	.07	13.29	2.75	2.75	41.	3.00	46.4
†May 27 June 1	530	220	310	0.0	0.0	0.0	1.6	1.6	1.5	.06	15.86	4.00	4.00	43.	4.00	54.5
†June 3-8	550	230	320	0.0	0.0	0.0	1.5	1.5	1.4	.10	17.30	5.35	5.35	43.	4.95	50.0
†June 10-15	.....	.....	.....	0.0	0.0	0.0	1.3	1.3	1.2	.04	16.26	4.50	4.50	47.	.....	.....

* Samples taken at first manhole below filter beds. † Samples taken at underdrain outlet.

COURSE.*

DATE. 1907.	PARTS PER MILLION.															Temperature deg. F.
	SOLIDS.			SUSPENDED SOLIDS.			ORGANIC NITROGEN.		NITROGEN AS—			OXYGEN CONSUMED.		Chlorine.	Dissolved oxygen.	
	Total.	Fixed.	Volatile.	Total.	Fixed.	Volatile.	Total.	In soln.	Free ammonia.	Nitrites.	Nitrates.	Total.	In soln.			
March 25 30	480	210	270	0.0	0.0	0.0	3.0	3.0	2.70	.030	6.77	2.7	2.7	41	7.10	45.5
April 1 6	462	188	274	0.0	0.0	0.0	1.5	1.5	0.50	.020	7.46	1.0	1.0	44	4.85	45.9
April 8 13	480	230	250	0.0	0.0	0.0	1.75	1.75	1.25	.020	9.06	2.5	2.5	42	4.60	46.4
April 15 20	432	200	232	0.0	0.0	0.0	2.00	2.0	0.25	.012	8.03	0.0	0.0	41	7.40	47.3
April 22 27	448	210	238	0.0	0.0	0.0	1.50	1.50	0.50	.024	7.34	1.0	1.0	40	6.15	48.2
April 29 May 4	460	190	270	0.0	0.0	0.0	1.50	1.50	0.50	.024	7.38	0.5	0.5	40	7.10	47.3
May 6 11	460	180	280	0.0	0.0	0.0	0.70	0.70	0.25	.020	8.66	3.5	3.5	38	4.85	48.2
May 13 18	480	220	260	0.0	0.0	0.0	0.60	0.60	0.25	.020	8.78	2.25	2.25	40	4.20	48.2
May 20 25	498	230	268	0.0	0.0	0.0	0.40	0.40	0.30	.024	9.46	2.85	2.85	38	6.20	49.5
May 27 June 1	512	220	292	0.0	0.0	0.0	0.60	0.60	0.50	.032	11.65	3.5	3.5	41	6.40	48.2
June 3 8	524	226	298	0.0	0.0	0.0	0.70	0.70	0.50	.040	11.76	4.95	4.95	40	5.70	47.3
June 10 15				0.0	0.0	0.0	0.40	0.40	0.30	.020	12.68	4.00	4.00	42	.....	.....

* The samples were taken at the point of final discharge of the disposal plant effluent into the natural water course which flows into Kayaderosseras creek. They represent the effluents from the intermittent slow sand filters mixed undoubtedly with ground water from the underdrained field below the filter beds.

TABLE D.— RESULTS OF CHEMICAL ANALYSES OF THE RAW SEWAGE AS IT ENTERS THE SEPTIC TANKS.*

	PARTS PER MILLION.													
	SOLIDS.			SUSPENDED SOLIDS.			ORGANIC NITROGEN.		NITROGEN AS			OXYGEN CONSUMED.		Chlorine.
	Total.	Fixed.	Volatile.	Total.	Fixed.	Volatile.	Total.	In solution.	Free ammonia.	Nitrites.	Nitrates	Total.	In solution.	
Composite sample for 24 successive hours	506	126	380	83	19	64	21.5	18.0	13.0	0.16	0.60	60.5	41	57
Composite sample, 6 A. M.—6 P. M.	532	144	388	105	28	77	23.5	19.5	15.5	0.24	0.63	70.5	46	69
Composite sample, 6 P. M.—6 A. M.	440	120	320	53	8	45	18.0	15.0	11.0	0.18	0.58	54.5	37	44

* The composite samples were made up of equal small portions taken hourly. Sampling was started at noon, May 24, 1907, and the last portions of the composite samples were taken 11 A. M., May 25, 1907.

The portions of the day composite samples were taken from 12 NOON to 5 P. M. on May 24th, and from 6 A. M. up to noon of May 25th.

The portions of the night composite samples were taken from 6 P. M., May 24th, up to 6 A. M. of May 25th.

TABLE E.— CHLORINE CONTENT IN PARTS PER MILLION OF THE RAW SEWAGE AS DELIVERED TO THE DISPOSAL PLANT*

DATE.	Hour.	Chlorine.	DATE.	Hour.	Chlorine.
5-24-'07	12 noon	71.0	5-25-'07	12 midnight.	42.0
5-24-'07	1 p. m.	62.0	5-25-'07	1 a. m.	47.0
5-24-'07	2 p. m.	167.0	5-25-'07	2 a. m.	41.0
5-24-'07	3 p. m.	67.0	5-25-'07	3 a. m.	36.0
5-24-'07	4 p. m.	77.0	5-25-'07	4 a. m.	32.0
5-24-'07	5 p. m.	70.0	5-25-'07	5 a. m.	35.0
5-24-'07	6 p. m.	51.0	5-25-'07	6 a. m.	32.0
5-24-'07	7 p. m.	44.0	5-25-'07	7 a. m.	31.0
5-24-'07	8 p. m.	59.0	5-25-'07	8 a. m.	31.0
5-24-'07	9 p. m.	46.0	5-25-'07	9 a. m.	41.0
5-24-'07	10 p. m.	49.0	5-25-'07	10 a. m.	52.0
5-24-'07	11 p. m.	53.0	5-25-'07	11 a. m.	120.0

Average chlorine—56.5.

TABLE F.— DISSOLVED OXYGEN CONTENT OF SEPTIC EFFLUENT BEFORE AND AFTER AERATION

Samples taken during the week beginning	Temperature. deg. F.	Amount Dissolved Oxygen.		Saturation of water at temperature given.	Per cent. saturation before aeration.	Per cent. saturation after aeration.
		Before aeration.	After aeration.			
March 18	40.1	2.80	6.40	12.97	21.58	49.34
March 25	41.9	0.00	3.60	12.63	0.00	28.50
April 1	41.9	0.00	3.50	12.63	0.00	27.71
April 8	43.7	0.00	3.30	12.30	0.00	26.82
April 15	44.1	0.90	4.80	12.23	7.35	39.24
April 22	46.4	0.00	3.10	11.88	0.00	26.09
April 29	47.3	0.00	3.75	11.73	0.00	31.96
May 6	50.0	0.00	2.35	11.32	0.00	20.75
May 13	50.8	0.00	1.90	11.20	0.00	16.96
May 20	51.8	0.00	3.20	11.05	0.00	28.95
May 27	52.5	0.00	3.40	10.94	0.00	31.07
June 3	57.2	0.00	2.60	10.35	0.00	25.12

LABORATORY DIAGNOSIS AND INVESTIGATION OF INFECTIOUS DISEASES

As heretofore the routine examination of cultures for the diagnosis of suspected diphtheria or sputum for the determination of the presence or absence of tubercle bacilli, of the application of the Widal tests to specimens of blood from suspected cases of typhoid fever have been carried on in the Bender Hygienic Laboratory by members of its staff, under the general supervision of the Director of the State Hygienic Laboratory. Follow-

*Samples were taken each hour for 24 successive hours, beginning at 12 o'clock noon, May 24, 1907.

ing is the report submitted by Richard M. Pearce, M. D., Director of the Bender Hygienic Laboratory, summarizing the work in these fields during the year:

Investigations of Typhoid Fever Outbreaks

The director and sanitary chemist of the laboratory have conducted field investigations into the causation of typhoid fever outbreaks in eight communities. Abstracts of the detailed reports are here inserted.

Piercefield

On December 19, 1906, the health officer of the town of Colton, Dr. W. J. L. Miller, Jr., reported by letter, without particulars, four cases of typhoid fever in Piercefield. He stated that cases had existed there in previous years, and he desired to learn the source of infection.

Dr. H. D. Pease, Director of the State Hygienic Laboratory, investigated the situation and extracts from his report follow:

I visited Piercefield on February 7th and obtained the following information from Dr. H. S. Carter and Mr. E. S. Daniell, manager of the local mill of the International Paper Company.

It is a village of about 700 persons, practically all of whom are employed directly or indirectly by the International Paper Company. This company owns practically the entire village, land, houses, etc., as well as the large pulp and paper mills located there.

The village is situated on the south bank of the Racquette river, approximately five miles below Tupper lake. The river receives the sewage from the sewerage system of the village of Tupper Lake, and is possibly contaminated by one or more saw mills on its banks between Tupper Lake and Piercefield.

The Piercefield village and paper mill water supply is taken from the Racquette river through a forebay, and is pumped directly into the village water mains, and the overflow passes into two stand pipes. The variations in the results of the bacteriological examinations of the village water above noted may be due to the fact that the water in the stand pipes is merely the reser-

that of all other inmates, and is of the same quality and taken to the wards to be eaten.

The absence of cases among the employees, and there are quite a number of them, would seem to exclude water as the source of infection.

Another point about the water is that it comes from the city of Rome's supply, and they do not seem to have more than three or four reported cases in a month in the city.

The milk and vegetables are produced on the asylum farm, and so it would be difficult to assume these as possible sources of infection.

The laundry from all inmates is washed in the same laundry and comes in contact with hot water for a considerable time. There is not however, any sterilization done by steam. The employees' laundering is not mixed with that of the inmates.

The superintendent acknowledged the possibility of secondary contact infection between given cases among the males and also the female cases, but we failed to find a mode of transmission that would be likely to exist that would connect the male cases with the female cases.

The only general contact between the different inmates would be in the amusement hall, and the cases have appeared in that grade of patients who do not enjoy these privileges.

The sewage from the institution is conducted to a cesspool, probably 600 feet from the institution and there could be a possibility of flies being the medium of transmission in some cases occurring in warm weather.

It is difficult for one outside of the Institution to trace out the possibilities of intercommunication between the different inmates and employees.

The superintendent discussed all the more probable modes of transmission, but we did not succeed in establishing any satisfactory probable avenue of transmission.

The comparative sporadic character of infection, its confinement to one grade of inmates and the freedom of the employees from the sickness, makes the problem more elusive.

Yours respectfully,

LEONARD M. WACHTER,

Sanitary Chemist

Other cases occurred, but left town either at once on feeling poorly or when suffering from the disease. Dr. Carter gave me the following names which represent but a small proportion of those leaving:

Name, Rafferty; sex, male; age, adult; left town, January 1st; died at Montreal.

Name, Watson; sex, male; age, adult; left town, December. Went to Ithaca.

In addition to the above definite cases there were several persons who suffered from fever of a mild type, but the diagnosis of typhoid fever was not definitely made.

The above cases occurred in all sections of the village. The milk used varied, several families having their own cows. The majority undoubtedly, and the others may, have used the village water supply. The village is small and the village water well distributed.

As the cases are well distributed over the whole village, there is no evidence whatever of contact infection, and there are probably no secondary cases on the above list. This can be attributed to the very excellent work of Dr. Carter who has personally seen to it that the discharges were properly disinfected and buried, or disposed of through the sewers. If it was not for Dr. Carter's excellent work, there would undoubtedly be secondary cases, because the surroundings of some of the cases were most unhygienic. This phase will be considered later.

From the investigation outlined there is but one conclusion, and that is that the village water was responsible for the outbreak.

Dr. Carter and others informed me that typhoid fever has been present in the village in other winters, but not in summer. It has never been present to the extent that it has been this winter. Usually two or three cases would be its extent.

The exact source of the pollution of the river cannot be stated absolutely definitely, but there are several possibilities, such as:

First. The sewage of the village of Tupper Lake entering the river five miles above with a frozen river, preventing purification of the river water which doubtless takes place when the river is open, may have been the cause. Against this is the fact that

the sewage from this village is much larger in amount in summer than in winter, owing to the larger population, and the river is lower, giving a greater concentration, and yet there had been no typhoid fever in Piercefield in past years until the winter months. However, the possibility that this sewage was the cause of the outbreak cannot be altogether excluded.

Second. The nearest source of pollution of the river to the village is the outside privy of the "Cutting Up Mill" which has been described. While it was impossible to learn of any of the workers in this mill having been sick, still the floating character and nature of the workers was such that a mild case of the disease, or a so-called "bacilli carrier" may have easily been amongst their number. I have already shown that some of the contents of this privy undoubtedly found its way into the river a short distance above the intake on the same bank, during the month of November when heavy rains occurred. The beginning of the disease rather sharply in December, with the most serious cases occurring at first, with the milder ones coming later, indicates a rapid pollution of the river of probably not a very long duration.

Third. Pollution at some saw mill between Tupper Lake and Piercefield. These few mills closed down in October or November, and if they played any part in the pollution of the stream it would be by the same method as at the cutting up mill.

I am strongly inclined to believe the causation of the outbreak to be due to the pollution of the Racquette river by the washing into it of materials from the cutting up mill privy.

I have already strongly advised the local manager of the International Paper Company, Mr. E. S. Daniel, to remove the privy from its present location and place the building over a water-tight vault, in order that its contents may not reach the river which is not over fifty or sixty feet away from the cutting up mill on three sides. I have also advised that the remaining excrement be removed and a fire built over the area upon which the shed stood, in order to destroy any remaining excrement on the surface. The soil is rocky and only surface contamination has probably occurred.

I would also recommend that the health officer be instructed to inspect the banks of the river from Piercefield to Tupper Lake, and to order the removal of any privy or other source of pollution found upon said banks.

I would make the following recommendations:

That the village authorities be advised to extend the sewer system so as to take in all the houses in the village, and entirely abolish the outside closets, except, perhaps, in the outskirts, and in case such are permitted to require the use of water-tight boxes, or vaults, the same to be cleaned at regular intervals and frequently disinfected.

That the villages of Tupper Lake and Piercefield be required to plan for the proper purification of their sewage at some future date before permission is granted for any extensions of their sewers now emptying into the Racquette river.

Respectfully submitted,

HERBERT D. PEASE,
Director

Whitehall

After having investigated typhoid fever outbreaks in 1904 and 1906, the Department was asked to investigate another epidemic which occurred in January, February and March, 1907.

Extracts from the reports and correspondence follow:

ALBANY, N. Y., *April* 3, 1907.

DR. EUGENE H. PORTER, *State Commissioner of Health, Albany, N. Y.:*

DEAR DOCTOR: — I have the honor to report the results of the office and field investigation of the occurrence of typhoid fever at Whitehall, N. Y.

Early in March reports began to be received at the Department, indicating that another epidemic of typhoid fever had started and was probably similar to those occurring for the last four years during the late winter, and concerning which reports were made by me. A few scattering cases occurred during the fall and early winter, but were not reported to us.

At the present writing there have been reported by Dr. Guinan, ıe health officer, fifty-one cases. The time of onset of the cases ras as follows:

DATE.	Jan. 28, 1907.	February.			
		6	15 & 16.	22.	26–28.
ases	1	1	4	1	3

DATE.	March.									
	1–3.	4–6.	7–9.	10–12.	13–15.	16–18.	19–21.	22–24.	25–29.	Unknown
ases	4	8	6	8	3	4	1	3	3	1

The age incidence was as follows:

AGES	5–10	10–15	15–20	20–25	25–30	30–40	40–50
ases	5	16	10	10	3	2	5

The reports indicate that all of the infected persons drank illage water except three. One of these was undoubtedly con-racted by contact with another case in the same house, and the eports state that two drank only spring water or boiled village ater.

There were numerous milk supplies from which the various ersons obtained milk, and no one dairy appeared to supply more them than any of the others.

On March 27th, Mr. Wachter went to Whitehall to investigate ıe water conditions, and his report is inclosed.

The following conclusions are, I believe, warranted:

That Whitehall has been subjected to repeated winter typhoid ever epidemics due to the contamination of its village water upply.

That we have enough evidence at hand regarding the pollution f the Mettawee river from which the water supply is drawn to

gratuitously offered his very valuable services, began the examination of these cultures. By the evening of the 13th, when the examinations were completed, it was found that while no frankly typical diphtheria bacilli were found in any of the cultures, forty-six contained very suspicious bacilli, generally resembling the early forms of the true diphtheria bacilli when grown on serum.

The contents of these forty-six cultures resembled microscopically those most frequently obtained from convalescents from diphtheria at the later stage when strictly negative cultures may be soon expected.

It was noteworthy that in at least three instances two or more children from the same family were included in this group of forty-six suspicious persons. One of the most suspicious cultures was made from the teacher of the second grade. I recommended that these forty-five children and the teacher be excluded from attendance at school until subsequent cultures showed the disappearance of these organisms or until better controlled cultures could be obtained and studied. This plan was accepted by Doctor Halsey.

Since my return four cultures from as many suspects have been received by me and properly incubated and examined, and in one typical diphtheria bacilli were found and in two others the suspicious forms. There are a few convalescents still in quarantine awaiting negative cultures.

I further recommended that in view of the large number of abnormal throat conditions found in the scholars, that they be regularly subjected, at least monthly, to medical inspection and that when the school opened in the fall each scholar's throat and nose should be examined for evidences of acute inflammatory disease, and that if such exists that the child be excluded until it has been shown not to be harboring diphtheria bacilli.

In conclusion I would state that diphtheria has been spread throughout the village through mild unrecognized cases of diphtheria or by well bacilli carriers. That these persons have been quite numerous and cannot be wholly apprehended at this time, and that isolated cases of the disease may possibly appear for some weeks to come, but that the disease will probably remain very mild in type. That the transmission of the disease between school

ing pumped direct into the service mains. Pressure in the village at water office was 100 pounds. I was not able to meet the superintendent to get more detailed information.

There are forty odd cases since January, 1907, reported. As evidence pointed strongly to a water epidemic, I started to collect information on as much of the watershed as time permitted, making Granville village the starting point.

Saw one of the streams which go to make up the Mettawee river at a point two miles from Lake St. Catherine, its headwater. At this two-mile point the Electric Light & Gas Company have a sluice gate closed during the day to obtain as much power as possible at night for their power purposes during dry weather. The same company pumps the village water under contract, the system being owned by the corporation.

Another stream joins that which is the outlet from Lake St. Catherine, just outside of the village of Granville. This stream, I was told, skirts the village of Wells. Wells and Pawlet, two small country hamlets, both in the State of Vermont, are the only probable sources of infection that would enter the river until near the outskirts of the village of Granville. Drs. Davies and McKenzie both state that cases are rare in either Pawlet or Wells. The Vermont state line is but a short distance down stream from the confluences of the two streams which go to make up the Mettawee river.

There is a small stream crossing the highway, going east from Granville, and just north of this road there was an outhouse about twenty-five feet from the brook. This brook joins the Mettawee but a few hundred feet south of the said highway. But a short distance down stream is the intake for the Granville water supply. This particular possible source of infection might be in Vermont as the state line is very near there.

Conditions at Granville

The town health officer, also the village health officer, stated that typhoid cases did not occur frequently at Granville. Both doctors mentioned "three or four" cases occurring among the gas house employees. The gas works are down stream below the

village of Granville, and the doctors stated that these men drank river water. This would seem a circumstance worth consideration. Typhoid being rare in Granville, and their water supply being taken from the river just upstream from the village of Granville, would indicate that the pollution of the river is limited above the village of Granville, which might be caused by Pawlet or Wells. These men drank water from the river at the downstream end of Granville village, and had typhoid fever. There are possibilities of pollution of the river at Granville.

The following facts were gathered:

There are said to be no sewers built by the corporation, but private parties have built sewers laying in the streets. Some have been in use for many years, and additions have been attached from time to time. After building the sewers, the private parties turned them over to the village trustees, and the latter keep them in order and issue permits to tap the same, so that there is considerable domestic sewage entering the river at Granville through the semi-public sewer. A few years ago the corporation laid some storm water drains.

Besides these sewers there are numerous other nuisances along the stream caused by privies. Some are attached to the main buildings and overhang the stream. While crossing a bridge on the main street one can see a sign reading about as follows:

"$10 fine for throwing refuse into the river.

By order of the Board of Health."

Attached to the building just across the street from this sign, overhanging the river, is a structure, and directly under this structure is visual evidence of fecal discharges.

Behind the depot upstream from the bridge spanning the river at the main street, is a Hungarian settlement with outhouses very close to the river, and I was informed that at intervals the material from these privies is pulled into the stream with hoes.

But a few miles down stream is the village of Middle Granville, and the river passes through the village. Some of the houses are right on the bank of the stream, and where the highway bridge crosses the stream there is a hotel with an overhanging privy.

Two years ago there were several cases on one milkman's route in Middle Granville, and one of the cases lived at this particular

hotel. The members of the family of the milkman were sick with what the doctor called a slow fever.

A few miles down stream from Middle Granville is Truthville, a hamlet on the left bank of the river, most of the houses being 150 feet above the river level, and 400 or 500 feet from its bank.

There is a cross road with a bridge spanning the river, and on this cross road there is a case of typhoid, the man being a laborer and working at a paint mill near the above bridge, near which there is a dam. Dr. Sumner had two more cases of typhoid, but he attributes their infection to Whitehall. The source of infection at the paint mill he has not placed.

Beyond Truthville is the village of North Granville, a small hamlet, and I did not hear of any typhoid cases there. Middle Granville, Truthville and North Granville have no sewers, and do not have a water supply taken from the river.

Beyond North Granville to Whitehall I did not follow up the watershed, but am informed it is a farming country. There is a stream entering the main river near Whitehall and this passes Comstock, but Dr. Guinan informed me that it entered down stream from the Whitehall pumping station.

There are opportunities for gross pollution at Granville, the largest place on the watershed.

The legality of parts of the sewer system would seem to be a question to be looked up. Aside from the local population, Granville is the stopping place for numbers of transients who have business with surrounding places, and in this manner imported infection could be carried down the stream.

There are some conditions at Middle Granville that should be corrected, but as far as I am able to ascertain in the short time at my disposal, there is no exceptional opportunity for infection at Truthville or North Granville.

Respectfully yours,

LEONARD M. WACHTER,
Sanitary Chemist

ALBANY, N. Y., *April* 24, 1907.

Dr. J. S. GUINAN, *Health Officer, Whitehall, N. Y.*

DEAR SIR: — In reference to the investigations that this Department has been conducting as to the cause of the typhoid fever cases at Whitehall, I beg to say that our investigation has been completed and the facts ascertained have been carefully studied.

The reports indicate that all of the infected persons drank village water except possibly three. Careful studies of the local situation and conditions point almost exclusively to your village water supply as the source from which these cases were contracted.

It is evident, therefore, that this is the result of pollution in the Mettawee river, probably from Granville and places up the stream. If this Department had the authority to order the immediate discontinuance of all sewerage from Granville into the stream, I feel that it is a case where such action would be proper. But although the Legislature passed an act in 1903 giving the Commissioner of Health authority to control the discharge of sewage into the streams in the future, it did not see fit to confer upon him the immediate discontinuance of sewers already in existence.

While I have done all in my power to better conditions existing in Granville, it does not seem to be within my province to order the discontinuance of the discharge of sewage from the number of sewer systems in that village. It is, therefore, apparent that the only way that you can safeguard your water supply is by the construction of a modern filtration plant. I would recommend that you give this matter careful study and that you lay this communication before the board of health and see if some action cannot be taken looking toward the construction of such a plant.

I shall direct the board of health of Granville to prevent, as far as possible, the discharge of any sewage into the stream and urge upon them the importance of constructing a sewerage system with a sewage disposal plant, which, if properly operated, would no doubt remove to a large extent the dangers which at present threaten you.

Very respectfully,

EUGENE H. PORTER,

Commissioner of Health

ALBANY, N. Y., *April* 24, 1907.

Mr. M. S. STRONG, *President of the Board of Health, Granville, N. Y.*

DEAR SIR: — This Department has been conducting an investigation into the causes of a number of cases of typhoid fever which existed at Whitehall, N. Y. It appears almost conclusively from the reports of the experts of the Department that the cases which have existed at Whitehall, numbering over fifty, were due to the contamination of the village water supply, namely, the Mettawee river.

The reports of our inspectors show that a large part of this contamination comes from the village of Granville, and that there are a number of private sewers at Granville discharging into the stream and that there are also a large number of buildings along Main street having closets or privies which discharge directly into the Mettawee river.

I inclose you herewith a copy of the report of the inspectors and you are hereby ordered and directed, under section 25 of the Public Health Law, to convene your local board of health and serve the proper notices upon these parties, requiring them to abate these conditions and arrange these closets or privies so that they will not discharge directly into the river but into cesspools built according to the regulations of your local board.

You are further directed and required to notify me of the result of such action, and it is the purpose of the Department to prevent, as far as possible, any further contamination of this stream.

In reference to the private sewers, particularly those that have been constructed since 1903 — these are operated in violation of section 25 of the Public Health Law and the discontinuance of the use of these private sewers should be ordered at once. Under no circumstances will the Department permit the construction of any additions or extensions or any further private sewers discharging into the Mettawee river from the village of Granville, and if any such sewers are built or constructed the parties doing so will be prosecuted.

Plans for the sewer system and sewage disposal plant for your village were approved by this Department, June 17, 1905, and

I wish to urge upon your village officials the importance and absolute necessity of taking early action in the construction of this sewer system and sewage disposal plant in order to make proper arrangements for the citizens of your village.

I ask your earnest co-operation in this matter in the interests of the health of the citizens of this State and trust that you advise me promptly of the action taken by you.

Very respectfully,

EUGENE H. PORTER,
Commissioner of Health

ALBANY, N. Y., *June* 6, 1907.

Mr. M. S. STRONG, *President of the Board of Health, Granville, N. Y.:*

DEAR SIR.— Will you kindly advise me at once as to what action has been taken by your board of health with reference to the order served on you under date of April 24th, directing you to convene your board of health and requiring them to abate certain nuisances existing in your village.

Also advise me if any action has been taken looking forward to the construction of a sewer system and sewage disposal plant for your village

I trust this matter will receive your prompt attention and that you will give me this information by return mail.

Very respectfully,

EUGENE H. PORTER,
Commissioner of Health

ALBANY, N. Y., *June* 8, 1907.

EUGENE H. PORTER, *State Department of Health, Albany, N. Y.:*

DEAR SIR:— Replying to your communication of the 6th inst., would say that, as Secretary of the Granville Board of Health I prepared and served notices upon all parties named in your communication of April 24th. The notices were all served on or before May 22nd, on which day I notified you that the work had

been completed. You evidently failed to receive such notice or to take note of same.

Regarding sewage system or disposal plant we will have to refer you to the village board.

Yours truly,

FAY McFADDEN,
Secretary

St. Johnsville

Upon receiving a request, by long distance telephone, to assist the local authorities in locating the cause of a typhoid fever outbreak, the Department made an investigation in April, 1907, of the conditions at St. Johnsville.

The following reports give the details of the situation that existed.

The outbreak is a striking example of how one house on a watershed can be the cause of a typhoid outbreak.

The evidence is almost conclusive that the discharges from one person who was sick in the only house on the watershed, and whose blood gave a positive reaction to the Widal test, was the cause of this outbreak.

ALBANY, N. Y., *April* 20, 1907.

DR. H. D. PEASE, *Director, State Hygienic Laboratory, Albany, N. Y.*

DEAR DOCTOR: — The following is my report of the inspection made at St. Johnsville which was visited under your instructions:

St. Johnsville is a village of about 2,200 inhabitants, situated in the Mohawk valley, and compactly built along that stream. The surface to the north, or back of the village, rises quite rapidly, while the surface in the village itself inclines gently toward the river.

The public water supply is piped through the village, so that it is accessible in nearly all parts of the corporation.

As yet there are no corporate sewers, and cesspools are general. There are also some domestic wells in the village. A corporate sewer system is now being built that will sewer the whole village.

There are three knitting mills and a piano factory in the village, and I was informed there are about 1,000 people employed.

The first cases diagnosed as typhoid were first noticed about four weeks ago.

The typhoid cases are quite generally distributed throughout the village. There is one exception to this statement. A small section of one street, containing about fifteen houses, is as yet free from typhoid. This particular section of the street is supplied by an independent water supply — all that now remains of the original water supply in this village. This fact would seem to have considerable significance, inasmuch as all of the remaining part of the village receives its water from a distinctly different source.

As far as I was able to learn without making a formal house to house canvass, the cases are quite evenly distributed among the customers of all the different milk dealers, the information being obtained from informal conversations with all the physicians in the village.

One milkman, I learned just before leaving the village, had typhoid in his family, but as far as I was able to check up the cases he had fewer cases among his customers than any of the other milk dealers. All milk dealers get their milk from distinctly different sources.

The cases are distributed among all classes of people as regards age, occupation, etc.

The general distribution of the disease, the independent source of the different milk supplies, and the freedom from infection in the one section supplied by different water, would seem to place the responsibility for the outbreak upon the general water supply.

The watershed tributary to the springs up to the point of their collection for the water supply is but a few acres in area. The springs lie in a pocket, surrounded on all but one side by sandy hills with steep sloping sides.

There is but one probable avenue of any source of infection, and that is from the one side where the slope is more gradual. On this slope is one house about 300 feet from the springs' gathering grounds. An outhouse is fifty feet nearer the springs than the house. The slope of the ground from the house and the outhouse is gradual, and all toward the springs. The house is said

have been uninhabited for two years until nine weeks ago. At at time an old lady started to live there, and three weeks later nother family moved there. The general appearances do not dicate personal cleanliness.

The outhouse mentioned above is a flimsy affair, and is either ry shallow or very full, as fecal matter was visible from the tside at the ground level. There is considerable debris thrown ound this outhouse.

At the time of our visit, one of the lay members of the St. hnsville Board of Health went into the house and found the lest woman in bed, apparently sick.

There was a thaw which gave rise to turbidity sufficient to be ticed by the water consumers about three weeks prior to the set of the disease in the village. The turbidity indicated sur- ce wash, and at this time the ground was frozen and impervious. It was quite possible for fecal matter from the above outhouse reach the watershed, and if any of such pollution contained fection, there is a possible explanation of the cause of the ty- noid outbreak.

A further description of the water supply follows:

The different springs are led by means of trenches, filled with bble-stones, into a small pool holding but a few thousand gallons water. The cobble-stone trenches are covered with rough flat ieces of limestone. The pool is covered by a wooden superstruc- ure which they call the "spring house." The upper end of the pe system receives the water from this pool, and flows by gravity out seven miles to the village through a cast-iron pipe, eight ches in diameter as it starts from the springs. The water aches the village under about one hundred pounds pressure.

The abolishing of the one house mentioned above would make e population on the watershed practically none, and it is diffi- lt to imagine more ideal conditions than this gathering grounds one sees the water trickling out of nature's filter, a large sand- nk.

About a mile from the corporate limits, there is an automatic ief valve in the water main, and when the consumption is low the village this valve opens and allows the excess water to flow o a small rectangular reservoir, about 200 x 30 feet in area

Tests of Illuminating Oils

According to chapter 376 of the Laws of 1896 (the Domestic Commerce Law), and section 427-a of the Penal Code, it is unlawful in the State of New York for any person to "manufacture or have in his possession or sell or give away for illuminating or heating purposes in lamps or stoves within this State, any oil or burning fluid wholly or in part composed of naphtha, coal oil, petroleum, or products thereof, or of other substances or materials emitting an inflammable vapor which will flash at a temperature below one hundred degrees Fahrenheit, according to the instruments and tests approved by the State board of health."

In order to comply with this requirement, samples of oil were collected and tested as indicated in the following schedule, showing the results of these tests:

No.	DEALER.	Address.	Producer.	Flash point.
1	W. B. Daniels	Stephentown	Dealer stated Four Brothers "Headlight Oil"	108° Fahr.
2	S. C. Brown	Stephentown	Four Brothers Independent Oil Co., "Headlight Oil"	113° Fahr.
3	Henry Vedker	Troy, 745 Pawling avenue.	Said to be Tiona Oil Co	99° Fahr.
4	S. P. Simmons	Albany	Said to be Pennsylvania Oil Co	104° Fahr.
5	John Quackenbush	Troy, Second avenue	Troy Oil Co. (Standard Oil Co.)	101° Fahr.
6	Haight Brothers	Lebanon Springs	Said to be Standard Oil Co	102° Fahr.
7	Ward Brothers	New Lebanon	Said to be Standard Oil Co	100° Fahr.
8	John V. Stine	Albany	Said to be Standard Oil Co	111° Fahr.
9	John Grainer	Albany	Said to be Four Brothers "Headlight Oil"	105° Fahr.
10	Buffalo Refining Co	Buffalo		103° Fahr.
11	W. H. Foote Co. (oil workers)	Buffalo		106° Fahr.
12	Pease Oil Co	Buffalo		112° Fahr.

NOTE.— Every effort was made to obtain information as to the exact sources of the oil, but it was not always possible; and the statements of the retail dealers were accepted and recorded as indicated.

EDUCATIONAL WORK

State Sanitary Institutes

At the regular meetings of the institutes held at Binghamton, in January, and Rochester, in March, the laboratory was represented not only upon the program of speakers, but the exhibits shown were prepared and demonstrated by the director and the sanitary chemist.

The exhibit at Binghamton contained photographs, charts, tables, and apparatus illustrating the nature and characteristic features, the differential diagnosis, and the methods of transmission of

pletely empty it except through the village service mains, I would suggest that it be treated with copper sulphate before a fire might make its use necessary.

It would be desirable to have an impervious wall on the land side of this reservoir to prevent any possible seepage from that side.

By information I learned that typhoid feces had been buried in ash piles in certain yards in the village. Ash piles and garbage heaps are plentiful, and such practice makes them a menace to public health, and the local health officer should be asked to order their removal for the general good, and great care would be necessary in disposing of such ashes as might contain infectious matter.

The general use of cesspools makes the use of domestic wells dangerous because of the possibility of secondary infection, and their use should be discouraged.

Typhoid and disinfection circulars should be at the disposal of all the physicians to distribute to families when fever cases exist.

The number of cases the different physicians informally mentioned show the meager returns of cards to the Department.

The sanitary conditions at the dairy of the man Pomeroy should receive careful attention, as with typhoid in his family the possibilities of carrying infection to his consumers are very grave.

Respectfully yours,

LEONARD M. WACHTER,
Sanitary Chemist

ALBANY, N. Y., *April* 20, 1907.

Dr. E. H. PORTER, *State Commissioner of Health, Albany, N. Y.:*

DEAR SIR: — Inclosed is the report of Mr. Wachter on his investigations of the typhoid fever situation at St. Johnsville, N. Y. Upon Mr. Wachter's return, I at once wrote to Dr. C. C. Vedder at St. Johnsville, requesting him to co-operate with Dr. Levi Wood, H. O., of Ephratah, within whose jurisdiction the Congdon house, which is evidently the offending factor, is located, to the end that the privy should be cleaned up and the danger from it removed. I also wrote at once to Dr. Wood requesting him to

take action regarding the privy and suggested that it be surrounded by a ditch and then disinfected with chloride of lime. I also requested him to send us a sample of blood from the woman sick at this place.

I would suggest that the following precautions be taken: That 150 circulars be sent to Dr. Vedder for distribution to the physicians of the village, with the request that they distribute them to the families affected, and request compliance with the rules laid down in them. That the Pomeroy dairy be kept under close supervision, and that if it is not possible for those washing the milk pails and the milkers to be separated from those sick with typhoid and those nursing the patients, then his milk should not be allowed to be distributed for general use. That in removing the ash piles and garbage heaps great care should be taken to deposit the same where the infectious matter will not be washed into any water course. They should not be dumped so that the Mohawk river would become polluted. That the individual wells in the village should not be used for drinking purposes on account of their possible pollution from the cesspools into which the typhoid discharges have been carried. That the instructions given by Mr. Wachter to the president of the village regarding the use of copper sulphate in the water in the reserve reservoir be carried out before the water is allowed to enter the village water system.

Yours sincerely,

HERBERT D. PEASE,
Director

ALBANY, N. Y., *April* 20, 1907.

MR. ENGELHARDT, *St. Johnsville, N. Y.:*

DEAR SIR: — Following are more detailed instructions for the purification of the emergency reservoir, as we suggested:

Take fifteen pounds of crystallized copper sulphate and divide it into two parts, using each half for one half of the area of the reservoir.

Tie the seven and one-half pounds in a burlap bag or other porous cloth, and drag it over the surface of the water. It should be dragged rapidly at first when all of the seven and one-half

pounds of sulphate is in the bag and more slowly as the sulphate begins to dissolve out.

Endeavor to drag it as nearly as possible all over the surface, covering one-half of the reservoir with each seven and one-half pound portion.

It would be best to try the dragging with an empty bag first so as to find out the best way to manage the distribution before actually using the copper sulphate.

We would suggest that you personally see the work done as we would not trust such work to an average workman.

Yours truly,

LEONARD M. WACHTER,
Sanitary Chemist

Central Valley and Highland Mills

May 11, 1907, Dr. D. H. Sprague asked the Department for assistance in determining the cause of an outbreak of typhoid fever that then existed at Central Valley and Highland Mills.

The results of the inspection and the action taken in the matter follow:

ALBANY, N. Y., *May* 21, 1907.

DR. EUGENE H. PORTER, *State Commissioner of Health, Albany, N. Y.*

DEAR SIR: — In response to your request that the health officer of Central Valley, Dr. D. H. Sprague, be given some assistance in locating the cause of an outbreak of typhoid fever at that place I detailed Mr. Wachter to investigate the same.

Inclosed is his report on the matter together with the results of the examination of a sample of the Cromwell lake water which is suspected of being concerned in the causation of the outbreak.

Mr. Wachter's report indicates the probability that rules for the protection of the water shed made by this Department are being violated and that there are dangerous conditions existing on the water shed which could and should be corrected. While the examination of the water does not indicate that it is at present polluted, the influx of summer visitors to the hotels and boarding-

Papers and Addresses by the Sanitary Chemist, L. M. Wachter

Water Analysis — State Sanitary Institute, Rochester, March 6th.

Sanitary Inspection of Wells — Annual Conference of State Sanitary Officers, Buffalo, October 17th.

Respectfully submitted,

HERBERT D. PEASE,
Director

APPENDIX, HYGIENIC LABORATORY

obtained from those in charge of the following institutions, organizations and individuals:

State Hospital for the Treatment of Incipient Pulmonary Tuberculosis, Raybrook.

The Adirondack College Sanatorium, Trudeau.

Stony Wold Sanatorium, Lake Kushaqua.

Reception Hospital, Saranac Lake.

Tuberculosis Hospital, Clinton Prison, Dannemora.

Saranac Lake Laboratory for the Study of Tuberculosis, Saranac Lake.

Saranac Lake Society for the Control of Tuberculosis.

Loomis Sanatorium, Liberty.

The Sanitary League of Yonkers.

Montifiore Country Sanatorium, Bedford Station.

The Committee on Prevention of Tuberculosis of the Charity Organization Society, New York City.

New York City Department of Health.

New York Association for Improving the Condition of the Poor.

Sea Breeze Hospital for Children, Far Rockaway Beach.

Christ Church Tuberculosis Class, New York.

Society for the Home Treatment of Consumption in Troy.

The Albany Guild Tuberculosis Class.

Municipal Hospital, Department of Health, Rochester.

Department of Health, Syracuse.

New York State Hospital for Crippled and Deformed Children, West Haverstraw.

We are especially indebted to the following persons who not only kindly contributed exhibits but assisted very greatly in the organization of the work by advice and suggestions:

Dr. Oscar H. Rogers, Yonkers.

Dr. John H. Pryor, Buffalo.

Dr. A. H. Garvin, Raybrook.

Mrs. James E. Newcomb, New York.

Dr. H. S. Goodall, Lake Kushaqua.

Dr. E. R. Baldwin, Saranac Lake.

Dr. Lawrason Brown, Saranac Lake.

Mr. Herbert Scholfield, Trudeau.
Dr. J. B. Ransom, Dannemora.
Dr. V. A. Moore, Ithaca.
Dr. W. H. Kelly, Albany.
Dr. H. M. King, Liberty.
Dr. Alfred Meyer, New York.
Mr. Paul Kennaday, New York.
Dr. John S. Billings, Jr., New York.
Dr. B. H. Waters, New York.
Dr. Lewis Gregory Cole, New York.
Dr. George W. Goler, Rochester.
Dr. D. M. Totman, Syracuse.
Dr. J. N. F. Elliot, Syracuse.
Dr. George J. Eckel, Buffalo.
Dr. H. W. Carey, Troy.
Dr. C. K. Winne, Jr., Albany.
Dr. L. Rosenberg, Bedford.
Dr. S. A. Knopf, New York.
Dr. A. F. Holding, Albany.

Certain articles for the demonstration of proper methods of outdoor living and in the treatment of tuberculosis were loaned by Kny Scheerer and Company of New York, and The Kenwood Mills of Albany; Wagner Manufacturing Company of Cleveland, Ohio and others.

The mechanical problems of construction of the Exhibition, keeping in mind the necessity for its repeated transportation was one requiring some consideration.

From past experience in exhibition work the conclusion was forced upon us, that if at all practical, the exhibition should include its own supporting structure for the framed exhibits.

Dr. John S. Billings, Jr., of the New York City Health Department, strongly advised the standardization of the frames and of the exhibits as far as possible. The section educational frames and their holders in the form of oak boxes* are well known to all who have attended national fairs, but they have the decided objection that only one framed chart or photograph is on view at a time and entire dependence must be placed upon the outside

* New Jersey School and Church Furniture Co., Trenton, N. J.

ALBANY, N. Y., *October* 2, 1907.

Hon. EUGENE H. PORTER, *State Commissioner of Health, Albany, N. Y.*

DEAR SIR: — I have been requested by Dr. John S. Fulton, Secretary-General of the International Congress on Tuberculosis, which is to be held in Washington, D. C., from September 21 to October 12, 1908, to procure the participation of this State in the movement to prevent the spread of tuberculosis, which is represented by the International Congress.

The importance of this movement can not be overestimated. It appears from the statement you have furnished me that upward of 50,000 cases of tuberculosis exist in the State of New York today, of which at least 20,000 are outside of the city of New York. It also appears that the average annual mortality in this State from tuberculosis has been for the last ten years 13,441. The work which the State has undertaken for the treatment of incipient pulmonary tuberculosis at the Raybrook hospital has had most gratifying results; and from the statistics of the hospital it appears that a very large percentage of the cases receiving proper treatment in the early stages are susceptible of cure. Not only humane motives, but economic considerations urge every effort to prevent the spread of this scourge.

In order that the State may be properly represented at the coming International Congress, I ask you, in accordance with Dr. Fulton's request and with the suggestion contained in your letter of recent date, to prepare a suitable State Exhibit.

I have also requested the State Department of Agriculture, the Agricultural Experiment Station at Geneva, the State Veterinary College at Ithaca, the State College of Agriculture at Ithaca, the State Hospital for Incipient Tuberculosis, the State Department of Education, the State Prison Commission, the State Commission in Lunacy, the State Department of Labor, and the State Department of Charities to designate members of their staffs, so far as may be possible within their respective appropriations, to aid you in the collection of suitable materials for the State exhibit. Copies of the letters sent to these various departments are inclosed herewith for your information.

It is desirable that the municipal divisions of the State, so far as possible, should be represented in the Congress. I request you, therefore, to communicate with local health boards and officers regarding the matter and to invite their coöperation and that of scientific and medical institutions, laboratories and medical societies and other agencies interested in the subject.

Very truly yours,

CHARLES E. HUGHES

As it then appeared that the exhibition would serve a double purpose, that is, for demonstration in this State and also at the International Congress at Washington, it was determined to make the scope and construction of the same such as would render it equally effective for both purposes.

As to its scope it was determined to make it a State exhibition for the purpose of showing what had been and is being done in the State in all aspects of anti-tuberculosis work. To this there was to be added such educational features as seemed advisable to have for use and demonstration during the State travels, and which need not of necessity be sent to the Congress at Washington.

Requests for exhibits of the first type were sent out to all the hospitals, sanatoria, associations, societies, dispensaries, day camps and the health officers of the large cities and many private individuals requesting them to contribute information, literature, blanks, reports of work undertaken and results, photographs, charts, and models or any other articles which would illustrate their work bearing upon any of the aspects of anti-tuberculosis work. In some instances trips were made by the Director of the Laboratory to obtain the necessary materials for these exhibits but in the majority of cases the exhibits were forwarded as a result of correspondence.

The Department is especially indebted to Dr. C. W. Crispell of Kingston, New York, for his exceedingly valuable and entirely voluntary and unremunerative assistance during the entire period of the construction and collection of the exhibition and later during its demonstration. Comprehensive exhibits were

are in place, and yet the knocking down of the structure is but a matter of a few minutes by removing the pins. As is shown in the single page drawings, each upright can hold six frames on a side, or twelve if both sides can be used, and this we term our single unit. Two of these can be set any reasonable distance apart, and by the use of a long top bar between them double units capable of supporting a much larger number of frames can be arranged.

A study was made to ascertain if anything would be gained by having the photographs, etc., mounted on the frames so that they could be hung with the length horizontally; but no advantage was obtained by the lessened height, and the same number of frames took up more linear wall space, which is always at a premium. In only one or two instances has the height of the frame supports (ten and a half feet) made it impossible to show the exhibits in the usual manner.

It is surprising how rigid the supporting structure becomes when the frames are hung upon it, and even when the frames are not on it, one can push it over only with difficulty.

By the use of this system, and with boxes holding ten frames, about 250 to 300 frames can be beautifully arranged and shown in a medium sized hall without driving a tack or a nail, or putting up a string or wire upon any part of the building or its furnishings. Even the fronts of the boxes can be used for tacking up notices or mottos, and practically every inch of space within comfortable visual range can be utilized.

Each unit composed of box and frame supporting structure can be procured for six dollars. They are best made of pine, unless thoroughly seasoned and non-cracking oak can be obtained for the boxes.

The mottos mentioned were drawn originally upon tracing cloth, and from these white and black prints have been made, and full sets of these on white paper can be obtained.

As for the other exhibits, we have the usual sanitary and unsanitary rooms, capable of being taken apart and transported in sections; the usual series of window tents, models of tents and shacks, sputum cups, sleeping bags, blankets, rugs, Klondike beds and other articles used in tuberculosis work.

Upon the frames are mounted photographs and tabulated data, blanks, etc., from all the sanatoria in New York State; most of the health departments of cities, and from tuberculosis classes, charity organization societies, and from other institutions and associations.

The whole exhibition can usually be put up in twelve hours and can be taken down in nine hours by two men familiar with it; but a few hours additional is always desirable. It cannot be handled exclusively by green hands to advantage. The feasibility and the practicability of the plan of construction and arrangement has been fully demonstrated in the many times it has been set up, wholly or in large part.

Plates I to III inclusive show the method of construction of the Exhibition and the boxes in which it has been transported.

Plates IV to VIII represent views of portions of the Exhibition as it was set up and demonstrated.

BUFFALO

The first appearance of the Traveling Tuberculosis Exhibition was at Buffalo in connection with the Seventh Annual Conference of Sanitary Officers of the State, October 15 to 26.

The local organizations co-operating with the State Department of Health in promoting the success of the Exhibition, were the local Department of Health, and the Tuberculosis Committee of the Charity Organization Society. The plan of campaign was as follows:

An important part of the program of the Conference of Sanitary Officers was devoted to the subject of Tuberculosis.

Dr. Eugene H. Porter, State Commissioner of Health, in his annual address to the health officers, devoted considerable time to the discussion of work of the Department in the prevention of this disease.

Papers were read as follows: Veranus A. Moore, M.D., Professor of Comparative Pathology, Cornell University, Ithaca, N. Y., "The Dissemination and Control of Bovine Tuberculosis as illustrated in the Bovine Species."

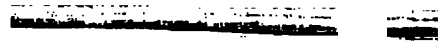
John H. Pryor, M.D., Trustee of the New York State Hospital for Incipient Pulmonary Tuberculosis, Ray Brook, N. Y.:

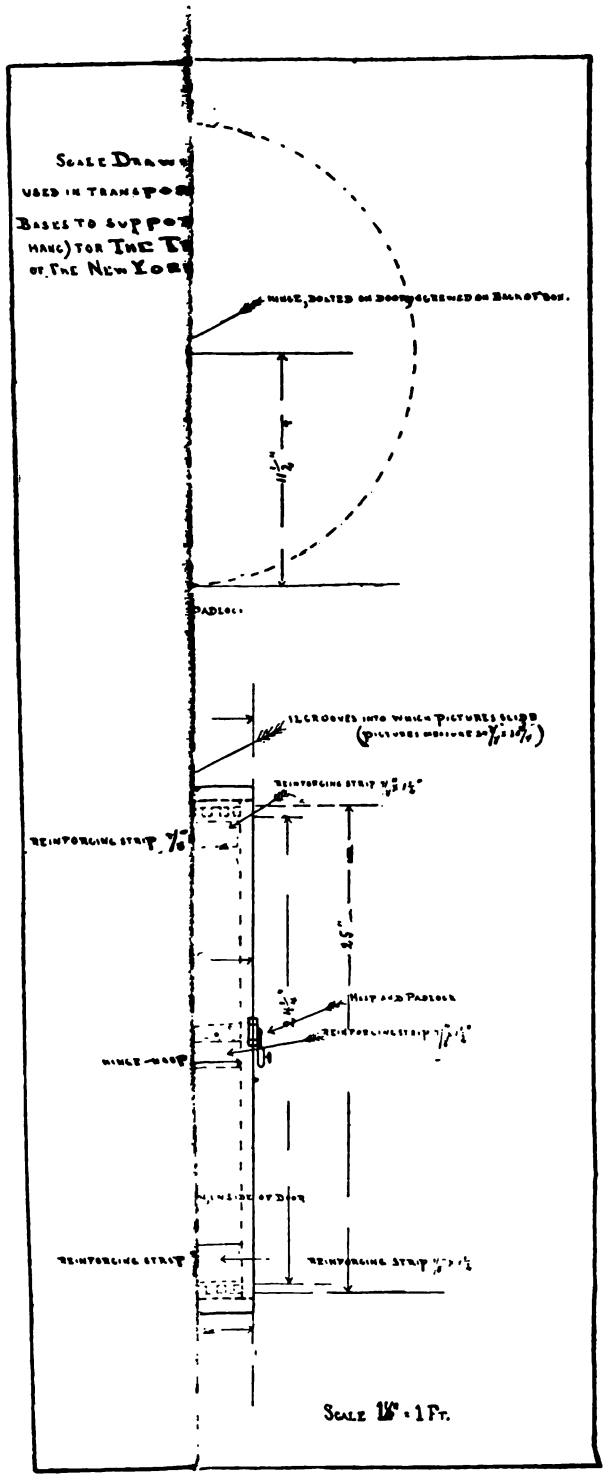
chart or photograph, to attract the attention of the casual observers in the exhibition hall. These box sets of twelve or more frames conserve space and can be hung at a height to suit the range of vision of the majority, but the above objection is a serious one from the standpoint of an educational propaganda. It was decided, if possible, to have all the frames exposed to view all the time. It was determined early that the individual frames in the above mentioned cabinet sets, and which carry cardboard mounts with an available exposed surface of twenty-two by twenty-eight inches, were the most inexpensive and lightest frames, with sufficient rigidity to withstand rough handling, which we could hope to obtain. They are the standard frame in our exhibition, although we also use a few of the frames thirty by forty inches, utilized by the same firm in their larger blackboard cabinets. Experience has shown that cardboard mounts placed in these frames would warp badly and pull out of the grooves on the sides when photographs or other articles were mounted upon them with the usual sticking compounds. This objection is a serious one from the esthetic standpoint and the warping subjects the projecting portions to injury.

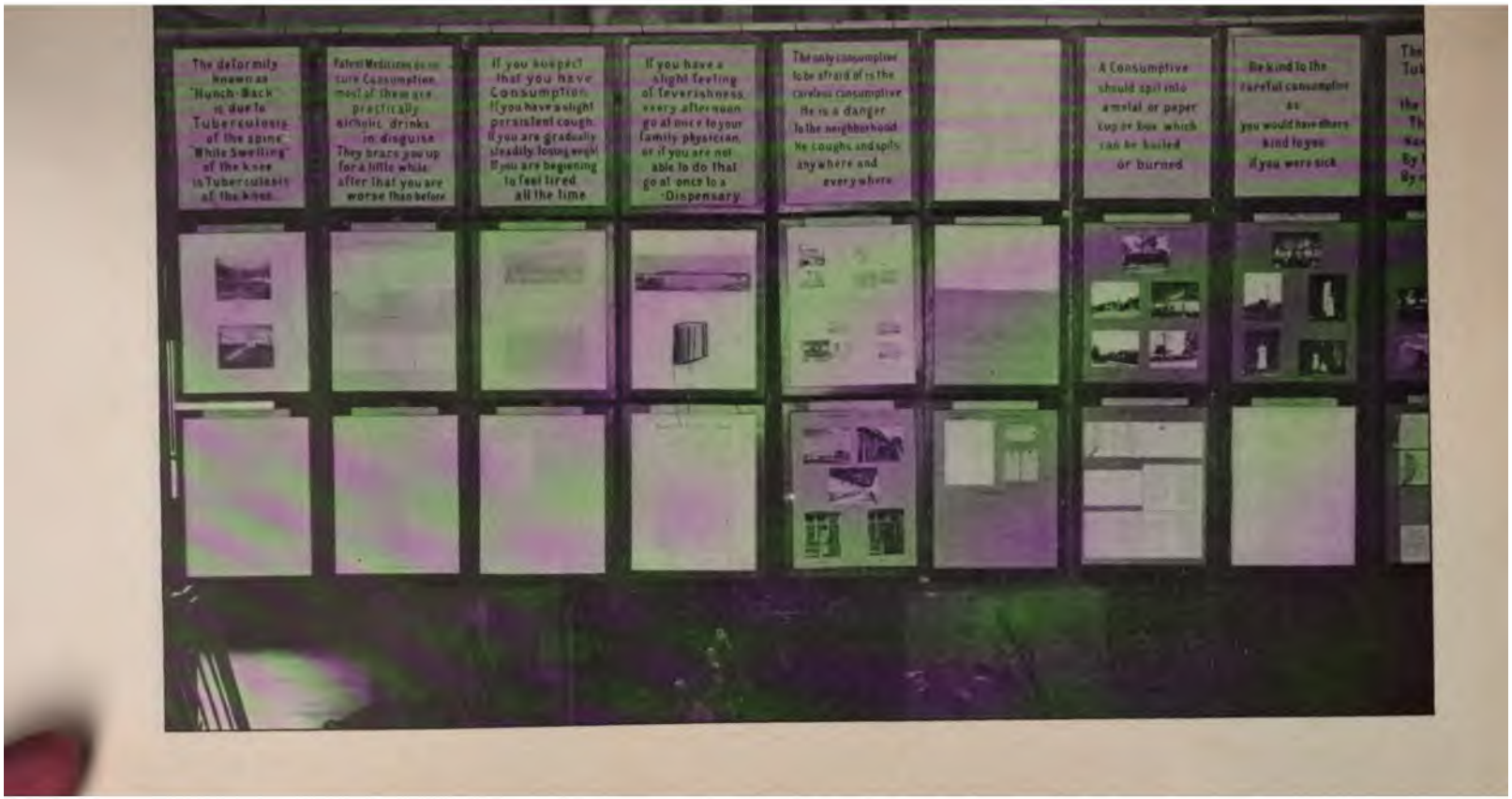
In casting about for a remedy by hunting for a more rigid nonwarpable mounting material, "Compo-board" * was tried and, while it is quite heavy and its use requires the alteration of the frames, it gives a hard, rigid surface and will not warp to any extent, even when an entire 22 x 28 sheet of cardboard is glued to one side of it and the whole mounted in one of the frames. It is possible that a lighter and better material for the purpose could be found, but we have not seen it as yet; and it could hardly be less expensive than the "Compo."

Our frames are now made up as follows: The two side rabbit edges on the back of the frame, that is the aspect upon which the removable end strips are placed, are cut away and this permits the sinking of a piece of "Compo," approximately $22\frac{1}{8}$ x $28\frac{1}{8}$ x $\frac{1}{4}$ inches, into the frame so that it looks like a panel from the front and presents a surface almost flush with the frame surface behind. The "Compo" is held in the frame by small brass wire screws, one inch in length, the outer half of which is bent at a right angle to the screw end. The screw end is worked into the frame

* Sold by E. G. Soltman & Co., 125 E. Forty-second street, New York city.




Scale Drawi
used in transpo
Bases to suppo
hang) for the T
of the New Yor
Hinge, bolted on door, screwed on Emmet Box.
Padlock
11 Grooves into which pictures slide
Reinforcing strip
Reinforcing strip
45"
Hasp and Padlock
Hinge-Hasp
Reinforcing strip
Reinforcing strip
Scale 1" = 1 Ft.

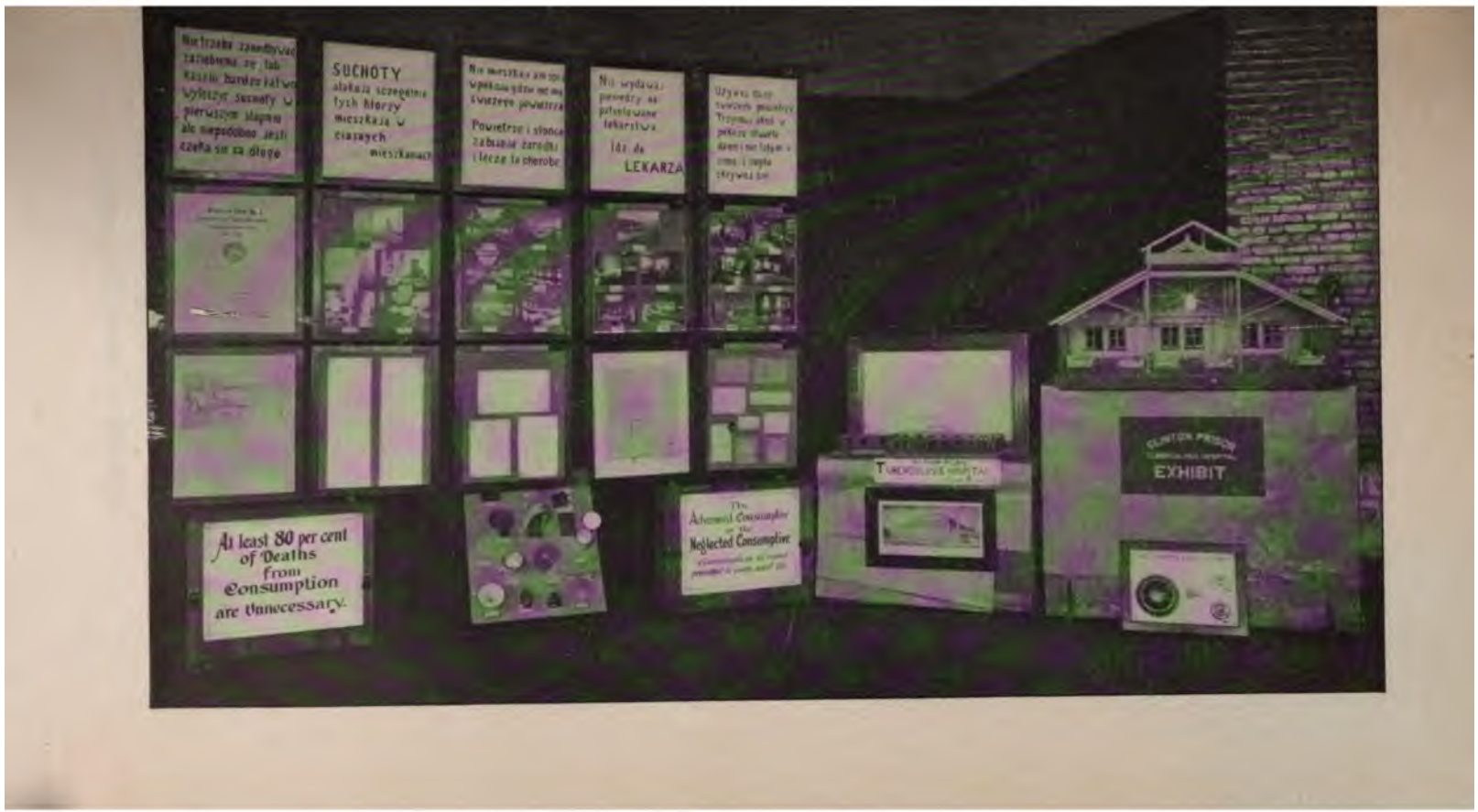

The deformity known as "Hunch-Back" is due to Tuberculosis of the spine. "White Swelling" of the knee is Tuberculosis of the knee.
Patent Medicines do not cure Consumption. most of them are practically alcholic drinks in disguise. They brace you up for a little while after that you are worse than before.
If you suspect that you have Consumption. If you have a slight persistent cough. If you are gradually steadily losing weight. If you are beginning to feel tired all the time.
If you have a slight feeling of feverishness every afternoon go at once to your family physician, or if you are not able to do that go at once to a Dispensary.
The only consumptive to be afraid of is the careless consumptive. He is a danger to the neighborhood. He coughs and spits anywhere and everywhere.
A Consumptive should spit into a metal or paper cup or box which can be boiled or burned.
Be kind to the careful consumptive as you would have others kind to you if you were sick.


The Germs of
Tuberculosis
enter
the living body
Through the
nose and Mouth
By Breathing
By infected Food
Consumption is
caused by the germs
present in the
consumptives spit
The germ soon
multiplies and goes
to destroy other
tissues in the lungs
DON'T
DON'T
SLEEP

Plate 7






SUCHOTY
LEKARZA
At least 80 per cent of Deaths from Consumption are Unnecessary.
EXHIBIT

The Early Diagnosis and Treatment of Pulmonary Tuberculosis."

Edward Devine, M.D., Secretary of Charity Organization Society of New York: "The Duty of the State in the Prevention of Tuberculosis."

For the benefit of the general public another series of meetings and demonstrations was arranged and an additional program was designed and distributed in large numbers. As this program has formed the basis for the majority of programs subsequently used in the demonstration of the traveling exhibition in other cities, it is here shown as issued:

TUBERCULOSIS EXHIBITION

AND POPULAR EDUCATIONAL MEETINGS ON TUBERCULOSIS

BUFFALO, NEW YORK

Under the Auspices of the

New York State Department of Health

Eugene H. Porter, M. D., Commissioner

Buffalo Health Department

Ernest Wende, M. D., Commissioner
Francis E. Fronczak, M. D., Deputy Commissioner

Buffalo Charity Organization Society

Frederick Almy, Chairman
I. P. Lyon, M.D., Chairman Tuberculosis Committee
George J. Eckel, M.D., Secretary Tuberculosis Committee

The Public is Cordially Invited
ADMISSION FREE

Convention Hall, October 15–19, 10 A. M. to 10 P. M.

m Polski, 1081 Broadway, October 21–23, 2 to 10 P. M.
(Demonstration and Addresses in Polish)

St. Stephen's Hall, Franklin and Swan Streets, October 24-26

(Demonstration and Addresses in Italian)

Nothing Objectionable or Dangerous

ırly Diagnosis and Treatment of Tuberculosis,

John H. Pryor, M.D., Trustee New York State Hospital for Incipient Pulmonary Tuberculosis, Buffalo, N. Y.

ıcial Aspects of Tuberculosis,

Edward Devine, Ph.D., Secretary Charity Organization Society, New York City.

Thursday, October 17th

?. M.—Address to School Teachers, The Prevention of ɔrculosis in School Children.

John H. Pryor, M. D., Buffalo, N. Y.

f.—Special Address to Members of Labor Unions and r Friends,

Deputy Health Commissioner Francis E. Fronczak, M. D,. Buffalo, N. Y.

ɔllowing Buffalo Physicians have Kindly Consented to Act as Volunteer Demonstrators of the Exhibition

bbott, M. D.	Edwin R. Gould, M. D.
ı W. Barrows, M. D.	Lawrence Hendee, M. D.
athaglia, M. D.	L. Kauffman, M. D.
ɔbee, M. D.	Horace Lograsso, M. D.
H. Billings, M. D.	D. C. Mckenney, M. D.
Borzilleri, M. D.	U. A. Noble, M. D.
ɔaber, M. D.	Jacob S. Otto, M. D.
Burlingham, M. D.	W. W. Plummer, M. D.
urnham, M. D.	John A. Ragone, M. D.
ɔegroat, M. D.	N. G. Russell, M. D.
Durney, M. D.	Burtin T. Simpson, M. D.
Fairbairn, M. D.	G. Tartaro, M. D.
E. Fronczak, M. D.	Harry L. Trick, M. D.
T. Getman, M. D.	A. F. Zittle, M. D.

s within the power of man to cause all germ diseases to disappear e earth."

—*Pasteur*

FOREIGN MEETINGS

ɔas found that in order to secure attendance of the foreign tion, it was necessary to have the Exhibition in the imme- ɔicinity of those localities, where the respective nationalities lomiciled in considerable numbers.

ɔas moved from Convention Hall, where it was first shown m Polski in the Polish quarter where the following pro- was carried out:

WYSTAWA ZWALCZAJĄCA SUCHOTY

i

Popularno-Naukowe Wykłady o Suchotach

w BUFFALO, NEW YORK

Pod opieką

Wydziału zdrowia Stanu New York

E. H. Porter, M. D. Komisarz

Wydzialu zdrowia w Buffalo

E. Wende, M. D. Komisarz

F. E. Fronczak, Pod-komisarz

Buffalo Charity Organization

F. Almy, M. D. Sekretarz

J. P. Lyon, M. D. Przewodniczący Komitetu

G. J. Eckel, M. D. Sekretarz Komitetu

Wstęp
wolny dla wszystkich

w CONVENTION HALL, Października 15go do 19go

od 10ej rano (a. m.) do 10ej wiecz. (p. m.)

w DOMU POLSKIM, 1081 BROADWAY,

Października 21go do 23go od 2ej do 10ej wieczorem

(Mowy i objaśnienia po polsku)

w ST. STEPHEN HALL, Franklin i Swan Ulica

Października 24go do 26go

(Mowy i objaśnienia po włosku)


SUCHOTY
LEKARZA
At least 80 per cent of Deaths from Consumption are Unnecessary.
Neglected Consumptive
CLINTON PRISON
EXHIBIT

PROGRAM ZEBRAŃ

W DOMU POLSKIM Października 21go do 23go

Poniedziałek Październik 21szy.

Wystawa otwarta od 2 do 10 wiecz.

Sesya otwarta wieczorem o godz. 8ej.

Pan S. E. Ruszaj, Prezydujący.

MAGICZNE OBRAZY.

Wykład o walce świata przeciw suchotom,

Pan W. H. Zawadzki.

Wykład: Suchoty i człowiek pracujący,

Dr. Fr. Fronczak.

Wtorek Października 22.

Wystawa otwarta od 2 do 10ej wiecz,

Sesya wieczorem o godz. 8ej.

Pan J. M. Rozan, Prezydujący.

MAGICZNE OBRAZY.

Wykład: Społeczna ważność suchot,

Pan J. S. Urbanski.

Wykład: Leczenie suchot przez szarlatanów i lekarstwa patentowane,

Dr. L. Schroeter.

Sroda. Październik 23.

Wystawa otwarta od 2ej do 10ej wiecz.

Sesya wieczorem o godzinie 8ej.

Ks. J. Wójcik, Predzydujący.

Wykład: Ile naród wydaje na suchoty,

Pan L. Olszewski.

Wykład: Jakie znaczenie ma słońce, powietrze, i odpoczynek w stosunku do suchot?

Dr. Fr. N. Pitass.

"The Early Diagnosis and Treatment of Pulmonary Tuberculosis."

Edward Devine, M.D., Secretary of Charity Organization Society of New York: "The Duty of the State in the Prevention of Tuberculosis."

For the benefit of the general public another series of meetings and demonstrations was arranged and an additional program was designed and distributed in large numbers. As this program has formed the basis for the majority of programs subsequently used in the demonstration of the traveling exhibition in other cities, it is here shown as issued:

TUBERCULOSIS EXHIBITION

AND POPULAR EDUCATIONAL MEETINGS ON TUBERCULOSIS

BUFFALO, NEW YORK

Under the Auspices of the

New York State Department of Health

Eugene H. Porter, M. D., Commissioner

Buffalo Health Department

Ernest Wende, M. D., Commissioner
Francis E. Fronczak, M. D., Deputy Commissioner

Buffalo Charity Organization Society

Frederick Almy, Chairman
I. P. Lyon, M.D., Chairman Tuberculosis Committee
George J. Eckel, M.D., Secretary Tuberculosis Committee

The Public is Cordially Invited
ADMISSION FREE

Convention Hall, October 15–19, 10 A. M. to 10 P. M.

Dom Polski, 1081 Broadway, October 21–23, 2 to 10 P. M.
(Demonstration and Addresses in Polish)

St. Stephen's Hall, Franklin and Swan Streets, October 24-26

(Demonstration and Addresses in Italian)

Nothing Objectionable or Dangerous

In October 24th the Exhibition was transported to St. Stephen's Hall in the center of the Italian district of Buffalo and the following program rendered:

ADUNANZE POPOLARI-EDUCATIVI CON ILLUSTRAZIONI

SULLA TUBERCOLOSE

Buffalo, New York

Sotto gli auspicii del

Dipartimento Sanitorio dello Stato di New York

Eugenio H. Porter, M.D., Commissario

Dipartimento Sanitorio di Buffalo

Ernesto Wende, M. D., Commissario
Francesco E. Fronczak, M. D., Vice-Commissario

La Societa Organizzatrice di Carità di Buffalo
Fredericko Almy, Segretario
I. P. Lyon, M. D., Dirretore del Comitato per la Tubercolose
George J. Eckel, M. D., Segretario de Comitato per la Tubercolose

Il Publico è Cordialmente Invitato
INGRESSO LIBERO

Convention Hall, 15–19 Ottobre, 10 A. M. to 10 P. M.
St. Stephen's Hall, Franklin and Swan Sts. 24–26 Ottobre, 2 to 10 P. M.

(Dimostrazioni e Conferenze in Italiano)

Dom Polski, 1081 Broadway, 21-23 Ottobre, 2 to 10 P. M.

(Dimostrazioni e Conferenze in Polish)

Non vi sara niente di Eccezionale o Pericoloso

L'esposizione Consiste di

Illustrazioni, Atlanti, Tavole Scientifiche, Modelli di Tende, Sanitorii, **Quadri** colorati, Fotografie di Alloggi che producono la Tubercosi e di Quartieri Sanitorii; e Vedute Cinematografiche dimostrative della Tubercolose — sua cause, mezzi di trasmissione e cura.

L'esposizione e Pratico e Utile

e può esse compresa da tutti. Uomini, donne e ragassi sono invitati a parteciparvi, Esso e' statto preparata dallo Stato di Nuovo York con grandi spese e questa è la prima volto che ha luogo.

In Buffalo nel 1906

90	morti	per	tifo
21	"	"	scarlattino
73	"	"	difterite
35	"	"	rosolio
496	"	"	tubercolose

Di questi 496, 348 erano fra i 20 eè 50 anni d'età — proprio nell' età pieu proprizia per la riproduzione

L'esposizione Dimostrera

come combattere questa terribile malattia la quole cagiona la perdita dell uno su dieci nella cifra dello mortalita — e uno su quattro tra quelli che nuoiono nell'eta dai 20 ai 50 anni.

Le Conferenze con le Vedute Cinematografiche

Avronno luogo tutte le sere secondo il programma sulla pagino opposto.

Non vi saro nulla di Vendita o di Reclame.

PROGRAMMA DELLE CONFERENZE

NELL' AULO DI S. STEFANO

St. Stephen's Hall, Ottobre 24–25–26

Giovedi, 24 Ottobre

L'esposizione si aprira dalle 2 to 10 P. M.
La Seduta serrale avrà luogo alle 8 P. M.

Presiederà Dr. Carlo Battaglia
Vedute Cinematografiche

I. Discorso del Signor F. Magnani,
SULLA LOTTA UNIVERSALE CONTRO la CONSUNZIONE
II. Discorso del Dr. G. Tartaro sui,
DOVERI DELL'INDIVIDUO, DELLA CITTA E DELLO STATO
VERSO LA CONSUNZIONE

Venerdi, il 25 Ottobre

L'esposizione sarà aperta dalle 2 to 10 P. M.
La Seduta Serrale avrà luogo alle 8 P. M.

Presiederà Dr. Orazio Lo Grasso
Vedute Cinematografiche

I. Discorso del Signor Cesare Antozzi,
SULLA IMPORTANZA SOCIALE DELLA CONSUNZIONE
II. Discorso del Dr. Giovonni A. Ragone,
SULLA CONSUNZIONE E LE ABITAZIONI ANTIGENICHE

Sabbato, il 26 Ottobre

I'esposizione sarà aperta dalle 2 to 10 P. M.
La Seduta serrale alle 8 P. M.

Presiederà il Sig. G. Banchetti
Vedute Cinematografiche

I. Discorso del Signor Domenico De Sio,
SUI DONNI CHE LA CONSUNZIONE PRODUCE ALLA NAZIONE
II. Discorso del Dr. Carlo Borzilleri,
SULLA LUCE SOLARE, l'ARIA PURA E IL RIPOSO COME MEZZI
ATTI A PREVENIRE E CURARE LA CONSUNZIONE

"È nel potere dell' uomo il fare sparire dal mondo tutte le malattie generate dai germi."—*Pasteur.*

La Consunzione

i prodotta principalmente dall' abitudine di

SPUTARE.

uto dei tubercolotici e pieno di piccoli germi che entrano nei pul-
altri individui e cagionano la malattia.

adate di non contrarre da voi stessi la Consunzione.

i medici migliori sono d'accordo sui seguenti punti:
VIVERE o dormire in stanze dove non ni è aria pura. L'aria pura
: del sole ammanzzano i germi, e curano la malattia.
VIVERE in aria pulverosa; spulverare e spazzare con panni umidi
)pe bagnate.
[ARE ENTRARE L'ARIA nelle stanze.
MANGIARE con mani sporche — moltigermi entrano cosi nell 'organ-
)roducono la malattia.
TRASCURARE un raffreddore o una tosse — è facile curare la
)ne nei primi periodi — è impossibile se la trascurate troppo a lungo.

ne bisogna curarsi.
NCIARE IMMEDIATAMENTE —ANDARE DAL MEDICO.
SPRECARE DENARO negli specifici; andare da un dottore.
BERE whiskey o attri liquori.
te Consunzione, dormite solo.
' ALIMENTAZIONE, ARIA BUONA, E RIPOSO, COLL' ASSIST-
)EL MEDICO, RAPPRESENTANO LA MEGLIORE CURA. TEN-
:L' ARIA PURA E ALLA LUCE DEL SOLE.
RE LE FENESTRE delle vostre stanze aperte notte e giorno, estade
10 e vestirsi caldo.

on propagare la Consunzione.

SPUTARE sui marciapiedi, pavimenti, etc. Sputare nella sputac-
nelle grondaie della strada.
RE alla faccia un fazzoletto quando si tossisce o si sternuta.

---

ugh the efforts of Dr. John H. Pryor and Dr. George J.
Secretary of the Tuberculosis Committee of the Charity
:ation Society of Buffalo, the attendance of all of the
hildren and teachers at the Exhibition was secured. Or-
ons of physicians, nurses, policemen, firemen, and others,
: sent bodies of delegates to attend special demonstrations
:xhibition at each of the three halls where the exhibition
wn.

The estimated attendance at Buffalo was 25,000, representing about 16 per cent. of the city's population. Since the visit of the Exhibition, a free open air camp for consumptives has been established, with the expectation that it will prove the forerunner of a municipal tuberculosis hospital.

NORTH TONAWANDA

At the conclusion of the meetings at Buffalo, the Exhibition was taken to North Tonawanda, where it was shown in the Felton High School, October 27th and 28th. Illustrated lectures were given by Dr J. H. Pryor of Buffalo, and Mr John H. Vogt of the State Department of Health. The estimated attendance was 3,000.

ALBANY

State Conference of Charities and Correction

The Exhibition was set up in the Assembly lobby and corridor in the Capitol, Albany during the Annual Conference of Charities and Correction in November. For three days large crowds not only of those attending the Conference but of citizens of Albany visited the Exhibition. School teachers brought whole classes of pupils to study it. It was estimated that not less than 3,000 persons visited the Exhibition during its display on that occasion.

A portion of the Exhibition was likewise displayed in a room in the city hall, Albany, during the annual meeting of the Third District Branch of the Medical Society of the State of New York late in October and attracted much attention. Immediately after the Exhibition was shown at Buffalo requests were received for its demonstration in other large cities of the State and plans were made accordingly. At this time presentations were made by the Hon. Homer Folks, Secretary of the State Charities Aid Association that a committee on the Prevention of Tuberculosis of the latter organization had been formed and that funds for its work had been contributed by one of the charitable foundations of New York city and that this committee intended to undertake to conduct in various cities in the State, local campaigns of education directed toward the enlightenment of the

blic, regarding the nature, transmission and prevention of the sease. He suggested that the development of a coöperative plan campaign between the Department and his Association would productive of better results than if each acted separately.

As this suggestion was supported by a willingness to assume me of the financial and other burdens which the Department had anned to place upon the locality requesting the use of the Exhition there appeared to open up a rare opportunity for the öperation of public and private forces in an effort to check the vages of the greatest destroyer of human life.

It was agreed to undertake this coöperative work on a tentae basis in a local campaign to be undertaken in the city of ica and upon the experience gained during that effort to plan a more extensive field of activity. The tentative plan was vever used as the basis for the conduct of the campaign in me as well as in Utica and the new basis of coöperation did come into operation until the campaign conducted in Troy ly in 1908. The tentative basis of coöperation consisted in contribution of the Traveling Tuberculosis Exhibition, and services of a manager and assistant, circulars on tuberculosis, sters for the trolley cars and the services of one or more mbers of the professional staff of the Department as lecturers. e State Charities Aid Association furnished the halls for the monstrations and meetings, assistants for the study of the tu-culosis mortality and contributing factors to the same, the con-ct of meetings, and the stimulation of local interest, the adver-ng expenses and the charges for all lantern slide demonstra-ns.

UTICA

n Utica, the Exhibition was shown at the Public Library n November 24 to December 5, 1907. In the Star Theater, lian quarter, December 7th to 10th, and at Turn Hall, Ger-n and Polish quarter, December 11th to 13th. At the meets in the foreign localities the stereoptican lectures were de-red in the language prevailing in the respective quarters.

While the Exhibition was at the library, it was viewed by a egation of prominent citizens of Rome, who had become in-

terested in combating tuberculosis, and incidental to the Utica campaign, lectures were given at a Grange meeting at Little Falls by Doctors W. E. Hunt and C. W. Crispell. A special meeting was also held at the Auditorium of the New Century Club, Utica.

The program of meetings in connection with the Exhibition at Utica, was as follows:

November 29, 1907 — Two meetings of Oneida County Medical Society. Speakers:

Dr H. D. Pease, Director State Hygienic Laboratory—
"Laboratory Assistance in Diagnosis of Tuberculosis."

Dr A. H. Garvin, Superintendent State Hospital for Tuberculosis, Ray Brook, N. Y.
"Early Diagnosis and Results of Home Treatment."

Dr H. M. King, Physician-in-Chief, Liberty Sanatorium—
"Establishment of Anti-Tuberculosis Leagues and Societies."

Dr B. H. Waters, Chief of Tuberculosis Clinics, New York City Department of Health.
"The Early Diagnosis and Home Treatment of Tuberculosis."

November 24 to December 6, 1907. Group Meetings.

a Teachers.

b High Schol Pupils.

c Nurses and Internes.

d Labor Unions.

December 7, 1908. General Public or Mass Meeting. Speakers —

Dr E. H. Porter, State Commissioner of Health.

Dr Livingston Farrand, Secretary, National Society for Prevention of Tuberculosis.

Hon. Homer Folks, Secretary, State Charities Aid Ass'n.

Col. W. C. Sanger, Vice-President Red Cross Society.

Mr George F. Canfield, Vice-President, State Charities Aid Association.

Dr W. H. Watson.

December 7, 1908. Meeting for Italian residents.

December 13, 1908. Meeting for Polish residents.

L'esposizione Consiste di

trazioni, Atlanti, Tavole Scientifiche, Modelli di Tende, Sanitorii, Quadri colorati, Fotografie di Alloggi che producono la Tubercosi e di Quartieri Sanitorii; e Vedute Cinematografiche dimostrative della Tubercolose — sua cause, mezzi di trasmissione e cura.

L'esposizione e Pratico e Utile

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L'esposizione Dimostrera

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Le Conferenze con le Vedute Cinematografiche

ano luogo tutte le sere secondo il programma sulla pagino opposto.

Non vi saro nulla di Vendita o di Reclame.

g Labor Unions.
h Italians.

The following physicians contributed their services as lecturers or demonstrators of the Exhibition:

Dr James H. Whaley, Health Officer of Rome.
Dr Arthur A. Gillette, Rome.
Dr Charles Bernstein, Rome.
Dr Thomas P. Scully, Rome.
Dr Francesco G. Rossi, Utica.
Dr J. Orley Stranahan, Rome.

December 20, 1908. General Public Meeting. Speakers:
Hon. A. R. Kessinger, Mayor of Rome, Presiding.
Dr H. D. Pease, Director, State Hygienic Laboratory.
Dr A. J. Brown.
Hon. Homer Folks, Secretary, State Charities Aid Association.

Total attendance at meetings and Exhibition, 2,675.
Population of city, 18,000, percentage of attendance, 14.8.

In the years 1901 to 1905, there were 138 deaths in Rome from tuberculosis, the percentage of total deaths from tuberculosis for the period being 10.0. In 1906, the percentage of total deaths from the disease was 4.3 and in 1907, 9.7.

Previous to the visit of the State Exhibition, no special attention was given to the reduction of the death rate from tuberculosis, and there was no hospital or other equipment for treating cases, nor was there in prospect any organization of citizens for systematic combat of the disease.

Since the campaign in Rome began, there has been organized an active Committee on the Prevention of Tuberculosis and the Board of Supervisors of Oneida County, in which Rome is situated, appointed a committee to investigate the conditions of the county almshouse, looking toward the erection of a general hospital and tuberculosis pavilion.

The utility of the portable nature of the State Exhibition was shown by the facility with which it was put up, taken and transported from hall to hall, and city to city, in the above itinerary

Plate IX.

TUBERCULO[illegible]
EXHIB[illegible]

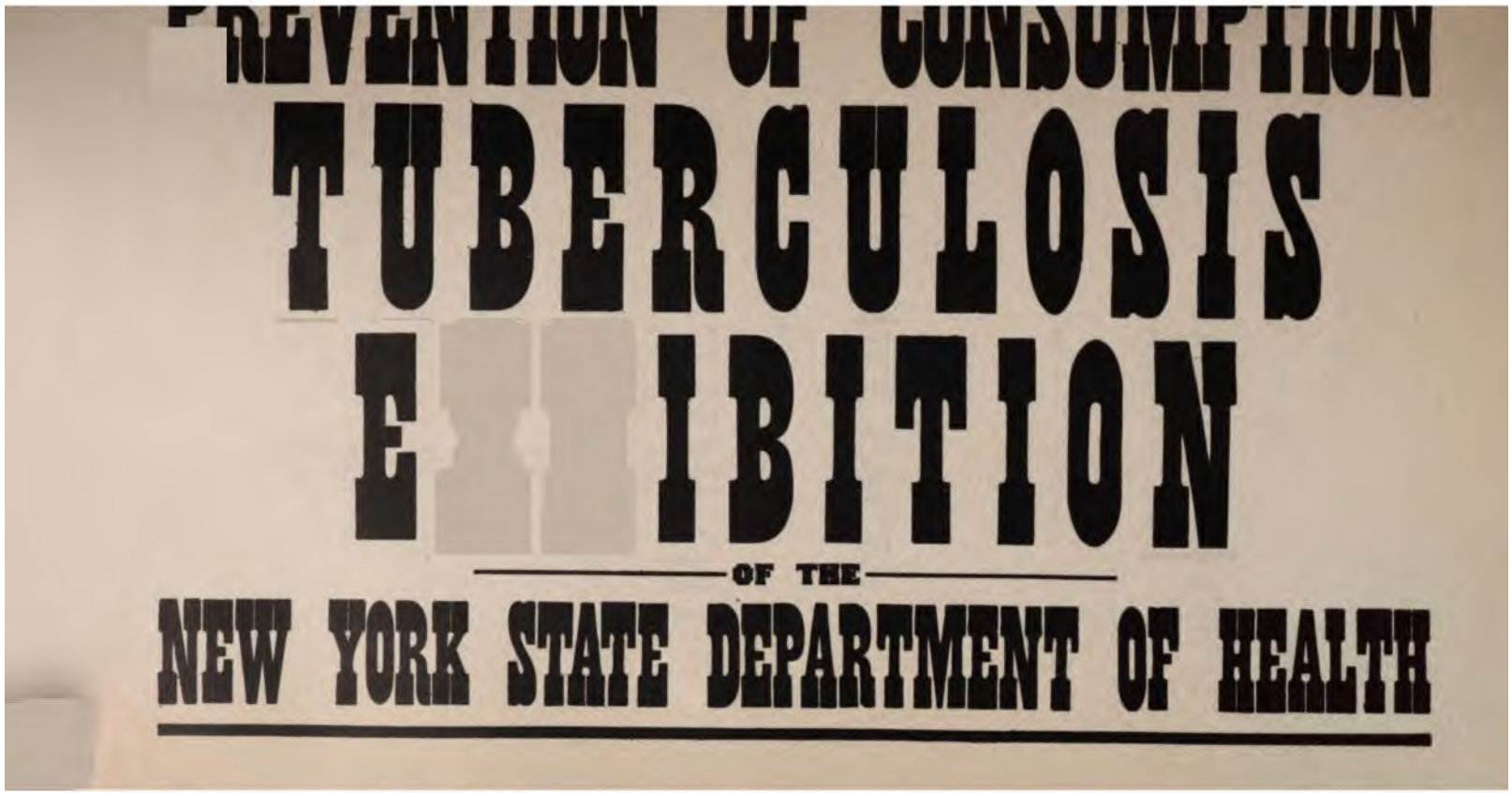
OF THE

NEW YORK STATE
EPARTMENT OF HEALTH

REQUENT POPULAR LECTURES
lustrated by Stereopticon

Vill Interest Everybody
ADMISSION FREE

O NOT SPIT ON SIDEWALKS, FLOORS OF STREET CARS OR PUBLIC BUILDINGS


PREVENTION OF CONSUMPTION
TUBERCULOSIS
EXHIBITION
OF THE
NEW YORK STATE DEPARTMENT OF HEALTH

Plates XI-XIII.

8-19-06-50,000 (21-10855)

NEW YORK

State Department of Health

ALBANY

EUGENE H. PORTER, M.D., Commissioner

IMPORTANT FACTS

ABOUT

Consumption

(TUBERCULOSIS OF THE LUNGS)

Cleanliness Prevents Consumption

Clean Habits Clean Air

Clean Rooms Clean Eating

g Labor Unions.
h Italians.

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The utility of the portable nature of the State Exhibition was shown by the facility with which it was put up, taken and transported from hall to hall, and city to city, in the above itinerary.

You Can Recover from Consumption

IF you are **TREATED** in the **EARLY** stage of the disease.

IF you **DON'T WASTE TIME** and money taking useless patent medicines and worthless advertised cures.

IF you avoid whiskey, beer and other alcoholic drinks.

IF you **LIVE** and **SLEEP** out of doors or in pure **FRESH AIR.**

IF you eat **PLENTY OF** plain and nourishing **FOOD.**

IF you take **PLENTY OF REST** in the open air and sunshine.

IF you are under the care of a capable physician and follow his advice strictly.

IF you go to a tuberculosis sanatorium or join a tuberculosis class and obey the rules.

How to Protect Your Family and Your Neighbor

DESTROY THE GERMS as they leave you.

SPIT only into a **SPITTOON** or **BOX** which can be **BOILED** daily or **BURNED.**

USE cheesecloth or paper handkerchiefs and burn them.

DON'T cough or sneeze without holding a handkerchief or paper before the face.

DON'T sleep in the same bed with anyone else, and if possible, not in the same room.

THE CAREFUL AND CLEAN CONSUMPTIVE IS NOT DANGEROUS TO THOSE WITH WHOM HE LIVES AND WORKS.

TAKE THIS CARD HOME and SHOW IT TO YOUR FAMILY.

Accessories to the Exhibition

In the efforts made to interest the public in the Exhibition and for the purpose of stimulating the attendance, two sizes of posters were devised, the smaller one shown opposite being utilized in Buffalo, Utica and Rome on the side windows of the trolley cars. The large poster together with copies of the small one were posted on the bill boards of all the cities visited.

LITERATURE

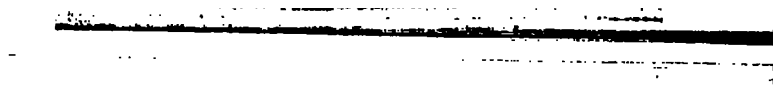
The regular circulars on tuberculosis, printed on yellow paper, were distributed in large numbers at each of the demonstrations of the Exhibition.

A four page card, similar in construction and scope to the well known "don't" cards, issued by the Charity Organization Society of New York City was devised. Large numbers of these cards were also distributed in connection with the local campaign.

LANTERN SLIDES

At the various meetings held as a part of the local campaigns, frequent popular lectures, illustrated by lantern slides were delivered by local physicians and members of the staff of the Department. Photographic prints of the available lantern slides, together with explanatory notes, bound in book form were placed in the hands of the lecturers some time prior to the date of the meeting. This enabled the physicians to familiarize themselves with the subjects and to make such selection of slides as they desired to demonstrate.

Plates 14 to 59, illustrate the more important slides in the series available for this purpose.



CANCER LABORATORY

[475]

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TAKE THIS CARD HOME and SHOW IT TO YOUR FAMILY.

determined that the enlarged lymph nodes taken from the animals which had died in this way, when introduced into healthy animals, were capable of repeating the obscure process referred to, the animals dying in a shorter period of time than in the first instance.

During the first period of our work we were largely engaged in attempting to determine with the microscope, the significance of certain inclusions in the cancer cells and certain free bodies found among them. In the Third Annual Report of the laboratory, we definitely committed ourselves to the parasitic theory of cancer, believing at that time that we had found the specific organism of cancer, and in the Fourth Annual Report of the laboratory, we attempted to justify our findings by comparison of the supposed organism with other known organisms of similar appearance. During the last five years we have not been able to bring any conclusive proof of the parasitic nature of these bodies, and realizing that without extensive collateral knowledge this would probably be impossible, we have directed our efforts in the last five years of work, to the collection of evidence tending to show in a general way that cancer is an infectious disease.

In the Third Annual Report of the laboratory, we were able to publish a carefully prepared and comprehensive statistical study, not only of the distribution of cancer in Buffalo (by Dr. Lyon), but also a study of the local distribution of cancer in a small town in Western New York. Both of these studies tended to show, in the first instance, a curious distribution of cancer, perhaps most easily understood when cancer is viewed as an infectious disease; and in the case of the small town of Western New York, only two explanations being possible for the increased number of cancer cases in this locality: first, heredity, and second, infection by contact or through indirect means. Since the publication of these papers, the discovery of cage infection among animals and the accumulating evidence of the endemic occurrence of cancer in localities the world over, have reached a point where it is highly probable that heredity is a contributing influence, and in the light of the readiness with which tumors can be transplanted among animals, it must be conceded that contact probably explains a certain number of these cases, whereas the remainder

tend to support the belief in the infectiousness of cancer. We have detailed at length in our various reports evidence relating to infected cages, animals introduced into which have acquired the disease. We have under observation a breeding establishment in New England, from which we receive several white mice every month with cancer of the breast. The detailed facts relating to this observation should prove absolutely convincing that cancer under given conditions is endemic.

In 1900 there was added to the staff of the laboratory, Dr. G. H. A. Clowes, a trained physical and biological chemist, who has conducted extensive, independent chemical researches on cancer. In the Fifth Annual Report he published a series of articles on the metabolism of cancer and investigations into the reliability of certain chemical methods used in the diagnosis of cancer of the stomach. Dr. Clowes also initiated the immune work on animals, the pathological and chemical work of the laboratory having united in this branch of research. In 1903 Professor G. N. Calkins of Columbia University accepted the position of consulting biologist to the laboratory and we have had the advantage of his advice in matters pertaining to his branch, and he has published several important articles in the reports of the laboratory.

In 1903 Dr. Lee Loeb spent part of the winter at the laboratory, conducting his new classical transplantation experiments with sarcoma in rats. In 1904 the laboratory came into possession, through the kindness of Professor Jensen of Copenhagen of the well known transplantable mouse cancer discovered by that investigator. Through this acquisition we were at once able to turn our attention to phases of the cancer problem which had attracted our interest from the very beginning of our experimental work. We were anxious to apply facts relating to immunity, firmly established in many of the infectious diseases. Believing confidently that cancer would prove to be an infectious disease, these experiments became naturally of the first concern to us, and with the opportunity afforded by the acquisition of animals with cancer, we have been able to demonstrate certain facts, which have been reported upon in detail in the annual reports of the laboratory. Some of these facts are fundamental and have now been confirmed in many quarters both in this country and in Europe. We were

Plate 14.



PROFESSOR ROBERT KOCH, WHO DISCOVERED THE BACILLUS OF TUBERCULOSIS IN 1882.

CANCER LABORATORY

BUFFALO, N. Y., *February* 1, 1908.

Dr. EUGENE H. PORTER, *Commissioner of Health, Albany, N. Y.:*

MY DEAR SIR: — I herewith transmit to you the Eighth Annual Report of the New York State Cancer Laboratory of the Department of Health, for the fiscal year ending October 1, 1907.

The last year has been one of rapid advance in cancer research, and we have again witnessed, as in the two preceding years, the advance of this reseach along the lines which this laboratory has been following since its foundation. In June of the present year the State Cancer Laboratory will have completed its tenth year of existence. It is perhaps well that at this time we should review the work of the laboratory for the first decade, and attempt to determine the relation of this institute to the modern cancer research in which it has taken a prominent part.

The first three years after the foundation of the laboratory were occupied in attempts to define the cancer problem and to determine which particular lines of research were the most promising. From the very beginning we were impressed with the belief that only through experimental methods could progress be expected. It can be fairly stated that in the two decades preceding 1898 no progress whatsoever had been made in the solution of the etiology of cancer, and that the purely histological methods in vogue at that time gave no immediate promise of assistance. The first three years of work were divided between working over the observations of other investigators and the introduction of the experimentation with animals. A long series of experiments was conducted to see if it was possible to transmit human cancer to animals. These experiments were generally negative, but in two instances animals which were inoculated with human cancer developed neoplasms under conditions which make it possible that the growths were due to the inoculation. Extensive attempts

Plate 17.



Schematic Representation of Normal Lungs, with Trachea and Bronchi and their Subdivisions.

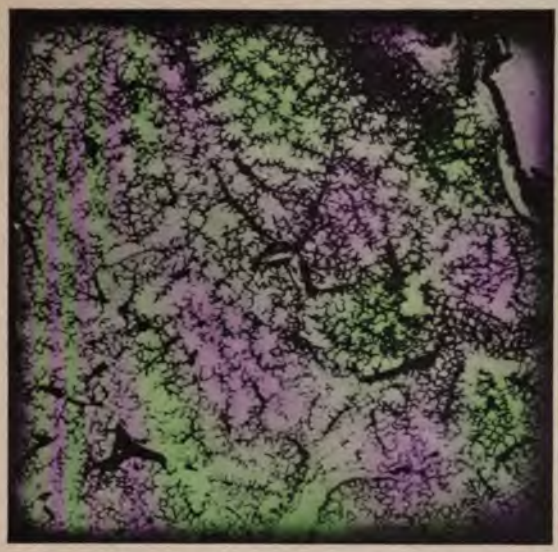
Plate 18.



Photo Micrograph of Normal Injected Lung Section, Showing Air Cells.

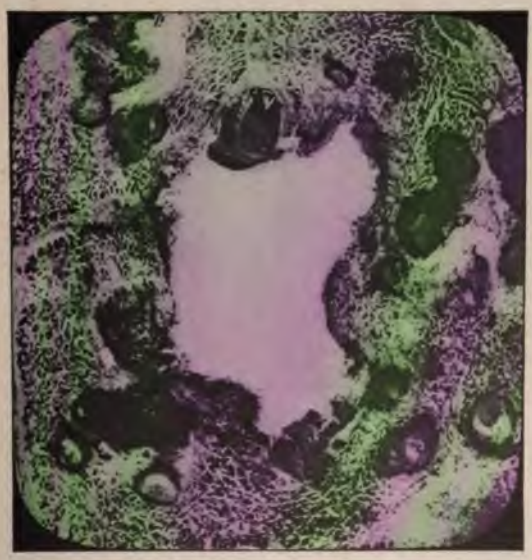


Plate 19.



Miliary Tuberculosis Tubercles Indicated by Solid Black Spots.

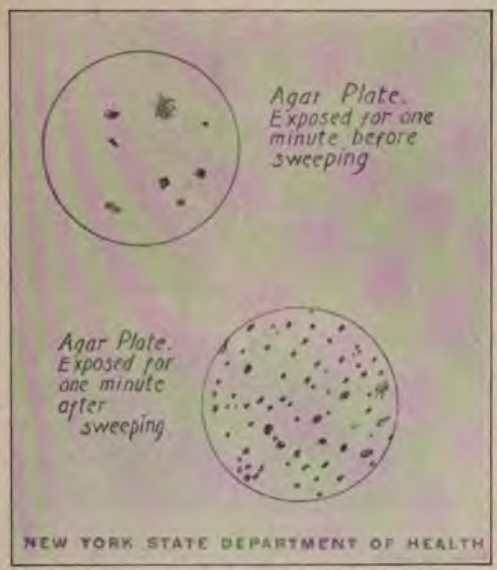
Plate 20.



Advanced Tuberculosis Showing Consolidated Lung with Cavities.

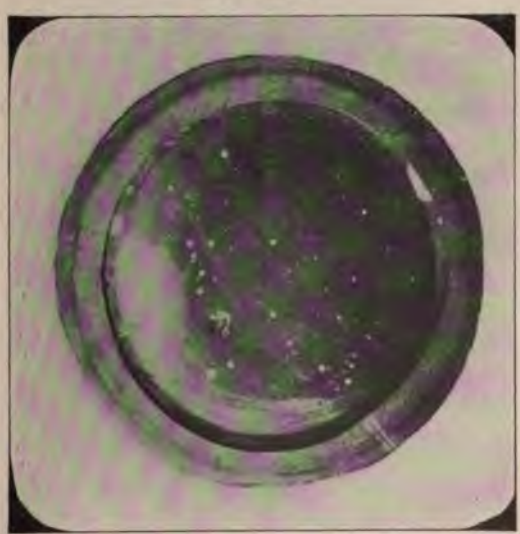
The latter are due to the disintegration of the tubercles.

Plate 21.



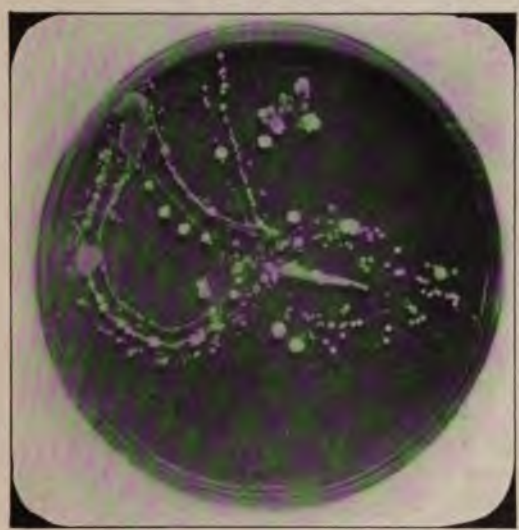
Showing Distribution of Germs by Dry Sweeping.

Plate 22.



Agar-Plate Held in Front of the Face of a Person Coughing and then Incubated. Shows a Number of Colonies.

Plate 23



AGAR PLATE UPON WHICH A FLY WHICH HAD BEEN FEEDING ON HUMAN DISCHARGES WAS ALLOWED TO WALK, AFTER WHICH PLATE WAS INCUBATED.

Plate 24.



A Dangerous Thing to Use about the Home or Office because it Stirs Up the Dust without Removing it. A Damp Cloth or a Dry Cloth, Frequently Shaken Out of Doors, is Recommended.

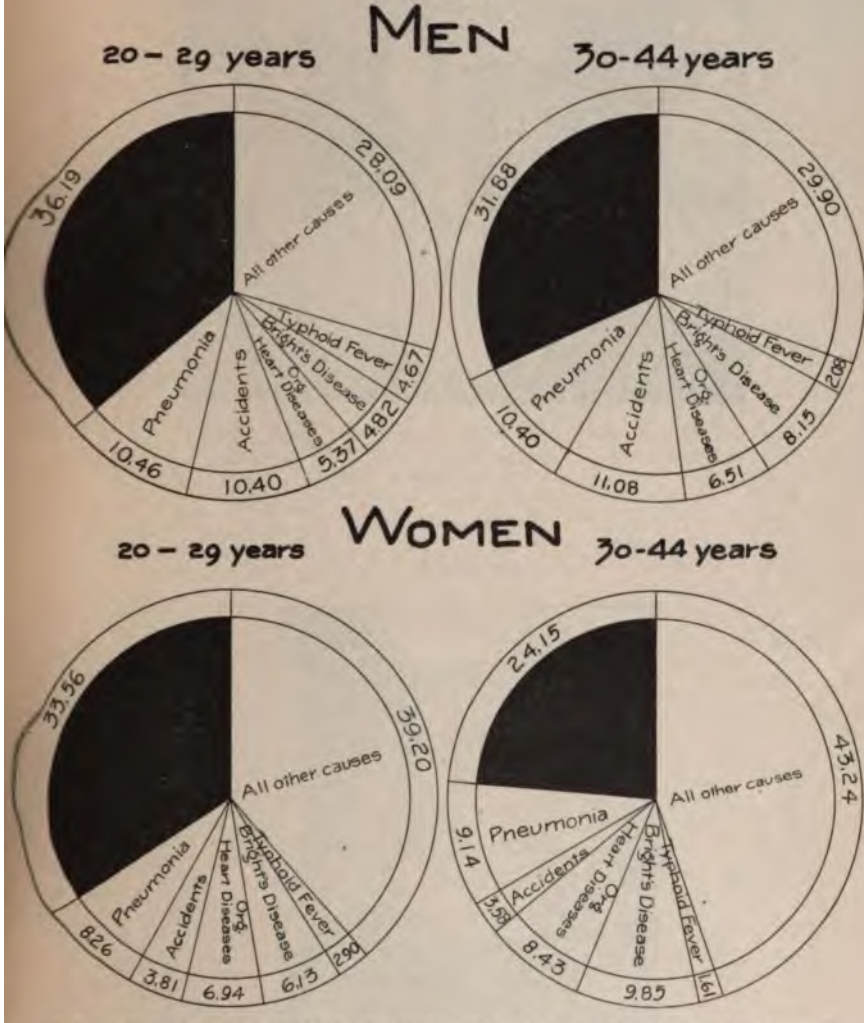


Plate 25.



An Adenoid Face.
Mouth breathing is often due to this cause and predisposes to consumption.

Plate 26.



Proportion of mortality caused by consumption in New York City, 1901. (Brandt)

DIAGRAM ILLUSTRATING RELATIVE MORTALITY FROM TUBERCULOSIS AND OTHER CHIEF CAUSES AT VARIOUS AGE PERIODS.

Plate 27.



New York Tenement Sleeping-Room, with no Direct Open-Air Ventilation. Ten Persons Slept in this Room.

Plate 28.



Room in Which a Girl was Found Suffering from Tuberculosis. Window Opens in So-Called Air Shaft.

Plate 29.



Light Airy Room. The Girl was Moved to this from the Room Shown in the Preceding Picture and Recovered Her Health.

Plate 30.



Dr. S. A. Knopf's Window Tent. Permits Sleeping in Out-Door Air with the Body in a Room not Uncomfortably Chilled in Cold Weather.

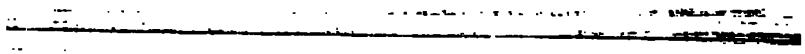


Plate 31.



Improvised, Inexpensive Balcony on Rear of House for Out-Door Treatment of Tuberculosis. Used by Troy Tuberculosis Class.

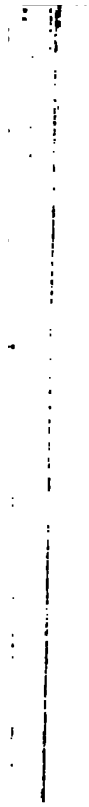


Plate 27.



New York Tenement Sleeping-Room, with no Direct Open-Air Ventilation. Ten Persons Slept in this Room.

Plate 28.



Room in Which a Girl was Found Suffering from Tuberculosis. Window Opens in So-Called Air Shaft.

Plate 33.



Rear Porch Partly Inclosed. Utilized in Out-Door Treatment.

Plate 34.



Using the Roof of a Tenement House for Taking the Cure in Summer.

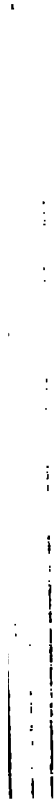


Plate 35.



For Out-Door Life, Syracuse.

Plate 36.



THE FIRST COTTAGE FOR OUT-DOOR TREATMENT IN AMERICA. BUILT BY DR. E. L. TRUDEAU.

Plate 37.



BUILDING WORTH $15,000. SECOND STAGE IN THE DEVELOPMENT OF THE BEAUTIFUL "TRUDEAU."

Plate 38.



TRUDEAU'S LABORATORY, SARANAC LAKE.

Plate 39.



INTERIOR OF TRUDEAU LABORATORY.

Plate 40.



Infirmary at Trudeau. One of the Thirty Buildings of the Great Sanatorium near Saranac Lake.

Plate 41.



Adirondack Cottage Sanatorium, General View.

Plate 42.



Cottages at Trudeau.

Plate 43.



Adirondack Cottage Sanitarium.

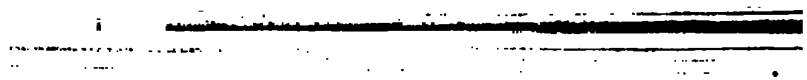


Plate 44.



Adirondack Cottage Sanitarium.

Plate 45.



Chopee, Adirondack Cottage Sanitarium.

Plate 46.



New York State Hospital for the Treatment of Incipient Tuberculosis at Ray Brook.

Plate 47.





Plate 48.



Plate 49.



Main Building of Stony Wold Sanatorium for Children and Working Women, Lake Kushaqua, N. Y., near Saranac Lake.

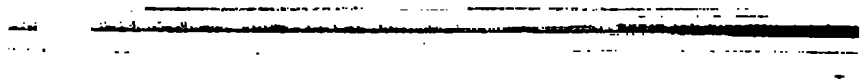


Plate 48.



Plate 49.



MAIN BUILDING OF STONY WOLD SANATORIUM FOR CHILDREN WORKING WOMEN, LAKE KUSHAQUA, [illegible], NEAR SARANAC LAKE.

Plate 52.



Out-Door School at Stony Wold.

Plate 53.



Sun Parlor at Stony Wold.

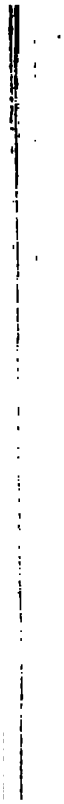


Plate 54.



A View at Stony Wold, Showing the Little Patients.

Plate 55.



The Model Cow Stable at Stony Wold.

Plate 56.



Reception Hospital, Saranac Lake.

Plate 57.



Rochester Municipal Tuberculosis Hospital. Originally Built for Smallpox.

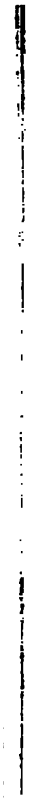


Plate 58.



Men's Ward, Rochester Tuberculosis Hospital.

Plate 59.



Pavilion, Rochester Hospital.

able to report to you in the Six and Seventh Annual Reports of the laboratory, that cancer is a curable disease; that animals recover spontaneously from cancer, are then immune, and that their blood possesses immune qualities, being injected into animals with small tumors frequently causing the disappearance of the same and the cure of the animals, and in the later stages of the disease markedly improving the condition of the animal and inhibiting the advance of the disease.

Dr. Clowes also showed that cancer material in test tubes treated with the blood of normal animals was inhibited in its growth, and that cancer material treated with the blood of recovered animals would, under suitable conditions, entirely lose its infectiveness, and that the number of successful transplantations accomplished after such treatment was reduced very materially.

Our first results relating to immunity were obtained in 1904 and published in January, 1905. In 1906 Professor Ehrlich of Frankfurt published results along similar lines, his methods of procedure being somewhat different from ours, he having succeeded in immunizing animals by inoculating them with tumors of low infectivity, and in this way raising the resistance of the animals so that they could withstand doses of more active materials. Ehrlich and his students have rather questioned our belief that the immune factors could be definitely located in the blood, and Bashford, an English investigator, who has strongly questioned our facts, has later confirmed them. He still declines to accept our interpretation of our results, although he succeeded in immunizing animals with the blood of normal animals, being a variation of Dr. Clowes' experiments in treating cancer material in the test tube with the blood of normal animals. The investigations and observations of Crile and Beebe, working under the Huntington Research Fund in New York, greatly strengthen our position. These observers, who have been working with a round-celled sarcoma in dogs have succeeded in curing animals in the last stages of the disease by transfusing diseased dogs with part or all of the blood of recovered dogs. These results have been obtained with such striking regularity, and as they are in principle an amplification of our original observations, we see no reason for altering our point of view that the immunity acquired

by animals after recovery from cancer finds an important, if not its main medium of activity, in the blood. Lewin working in the Royal Institute for Cancer Research in Berlin, with cancer in rats, has recently confirmed these observations in full.

The establishment of a definite immune process in cancer can only mean that the principles of this discovery must some day prove applicable in some form or other to cancer in human beings. It is, however, impossible to state what difficulties will have to be overcome, what fields explored or what disappointments met, before such a desirable end may be attained. Professor Ehrlich, in a public address in Berlin, on the occasion of announcing his results, which are in principle but slightly different from ours, made the statement that the serum-therapy of cancer was only a matter of time.

During the last five years the experimental investigation of cancer has broadened to such an extent that many investigators in different parts of the world are now pressing into this field, national institutes and societies have been founded and an international society for the investigation and combatting of cancer is in process of formation. To-day the outlook in cancer research is not only encouraging, but distinctly promising. If one calls to mind the pessimism which reigned ten years ago regarding cancer, and realizes to-day how differently the whole disease is viewed, how actively investigators are hopefully working upon the problem, and how promising is the outlook, one must concede that the results obtained are far greater than we could have possibly promised ourselves at the time this laboratory was founded by the State.

In this connection I desire to call your attention to the status of this institution. It stands to-day the first State laboratory or institute founded for the special investigation of cancer. Within the ten years of its existence is encompassed all of the modern discoveries which have placed cancer research where it is to-day. This institute has contributed to and borne its share of this research. It has lived a precarious existence; the members of its staff have gone on from year to year, through years of depression, criticism and disappointment, until to-day it has established for a position as a pioneer institute, recognized as a definite

factor in cancer research the world over. Beginning with two rooms, kindly placed at the disposal of the work by the University of Buffalo, the public-spirited citizens of Buffalo have erected for its exclusive use a handsome and well equipped laboratory, at a cost of more than $50,000. This institute has been placed at the disposal of the State so long as it shall maintain this work. The scope of our work has increased from year to year, as the possibilities opened by our observations and progress have developed. Starting with an appropriation from the Legislature of $10,000 the first year, with the development of our activities we found that we could profitably utilize $15,000 and with the still further development of our work we have for the last three years requested the Legislature to increase our appropriation. The opportunities to-day for advance are so great, the promise of the ultimate solution of this problem is so hopeful, and the devastation which the disease is carrying on among human beings is so terrific, that the Legislature should increase our opportunities and support our hands as much as possible. As you are well aware, the members of the staff of this laboratory have showed their obligations to this work, not from a financial standpoint, but from one of obligation to this work and to humanity. A review of our accounts since the establishment of the laboratory will surprise many. To-day we are heating and lighting a three-story building fifty by sixty feet, spending one-third of our appropriation for stock and equipment and paying twelve people with an appropriation of $18,000 a year. Aside from the most rigid economy and the exaction of self-sacrifice on the part of the members of the staff, the laboratory has suffered extremely from the uncertainty of its existence. For ten years New York State has provided for this work in the supply bill. This bill never passes the Legislature until the last hours of the session, and the members of the staff who are dependent upon their salaries for their livelihood, never have known from year to year whether the laboratory would be in existence the following year, or whether they would have to seek employment elsewhere. This is a state of affairs which has been most demoralizing for the laboratory and has seriously hampered the work of the institution. To-day we can look back upon ten years of creditable work. We have

reached a point where in another year it will be necessary to ask the State to put at our disposal the means to apply the modern discoveries in cancer research to human beings, and if the State is to follow up the advantage which it has gained by the expenditure already made, and is to reap the reward of the industry of its own employees in its own laboratory, it will have to support this institution for at least ten years more, and for this reason we feel that the disadvantage produced by the uncertainty and precariousness of our existence should be removed by providing for the maintenance of the laboratory in the regular appropriation bill.

Furthermore, we have reached a point where the scope of our work and our usefulness to the State is distinctly impaired for want of funds. The State should appropriate for the maintenance of the laboratory during the coming year not less than $25,000. This sum is absolutely necessary to enable us to undertake most promising fields of research, from which we are debarred by want of funds, and also to correct certain unfair discrepancies in the salary list of the institute.

Cancer removed from the population of the State of New York in the year 1907, 6,400, largely able-bodied inhabitants. This is an increase of 232 over the preceding year, and as we pointed out in our last annual report, cancer in the State of New York, in proportion to the population has increased during the last ten years nearly 25 per cent. Tuberculosis during the same period has decreased in proportion to the population nearly 5 per cent. We reiterate these facts simply to point out that the State of New York is suffering every year a heavy loss in useful citizens and that cancer research has to-day entered upon a period which gives hopeful promise for ultimate checking and control, as well as cure, of this disease, and that the State, having once entered upon this work, it is not only bad business policy but wasteful extravagance of human lives to fail to support to the fullest extent, an investigation which has progressed to so promising a stage.

In May of last year, on our initiative, there was formed an American Society for Cancer Research. This society contains all the prominent investigators in this country. It held its first

meeting in New York in November last at the Cornell University Medical School and Rockefeller Institute. On the 15th of April it will hold its second meeting in Buffalo at the New York State Cancer Laboratory. At that time this laboratory will have completed the first decade of its work. In justice to the record which this institute has made during that time, we feel that the Legislature of the State of New York should place us upon a sound footing, to demonstrate to the scientists of this country that the State is not abandoning the vital policy which dictated the foundation of this institute and its maintenance for ten years.

The expenses of the laboratory for the past year have been as follows:

1906.			1906.		
Sept. 30.	Balance	$2,748 13	Sept. 30.	Appropriation 1906–07	$18,000 00
1907.			1907.		
Sept. 30.	Stock and material	2,077 88	Sept. 30.	Balance	1,077 46
	Equipment	662 07			
	Expense	2,261 72			
	Salaries	11,327 66			
		$19,077 46			$19,077 46

The staff of the laboratory is practically unchanged from last year.

Owing to changing the period for the annual report from October to January, the scientific publications which fall within the year 1907 are fewer than usual, a number of publications having appeared earlier in the year and been included in the Seventh Annual Report.

I have again to express to you the appreciation of the staff of the laboratory for the interest, support and consideration which our work has received at your hands during the past year.

Very truly yours,

HARVEY R. GAYLORD,
Director

THE RHYTHMS OF GROWTH ENERGY IN MOUSE CANCER

By GARY N. CALKINS

In 1906 Bashford, Murray and Bowen* published a paper on the experimental analysis of the growth of cancer in which the attempt was made to ascertain the biological growth relations of cancer cells in the successive transplantations. Statistics of greater numbers of mice that had been inoculated with cancer were studied by them and the results were plotted in a curve in which ordinates represent the percentage of "takes" and the variable abscissas, the length of time required by the cancer cells to grow into a tumor fit for re-inoculation. This graphical method, although crude, showed unmistakable evidence of alternating high and low virulence, expressed by rhythmical fluctuations in the curve. The English observers maintained that the combined factors, percentage of takes and period of development, give a more or less accurate means of measuring the relative growth energy of cancer cells (the term growth energy being adopted as a substitute for the abused term virulence) and that this growth energy runs in rhythms of higher and lower potency in successive transplantations. Furthermore Oskar Hertwig and Poll† in 1907, studying the growth phenomena of cancer cells came to a similar conclusion and offered in evidence a number of curves showing similar rhythmical variations.

On first thought such rhythms of growth energy would be expected in rapidly and constantly dividing cells for such is the case in young embryonic cells and in free-living cells where the conditions for development are maintained. Thus for Paramecium protoplasm‡ which was kept under observation for twenty-three months and each cell division recorded, it was found that

* Bashford, Murray & Bowen. Proc. Roy. Soc. B. 1906. Vol. 78.

† Hertwig and Poll. Zur Biologie der Mäusetumoren. Abh. d. kön Preuss. Ak. d. Wiss. 1907.

‡ G. N. Calkins. Studies on the Life History of Protozoa. IV. Jour. Exp. Zool. I, 1904.

the division energy or growth energy, was manifested in regular cycles while in each cycle according to Woodruff's* later observations, there are definite rhythms of division energy. In these experiments food and environmental conditions were kept as nearly uniform as possible, and it was safely demonstrated that the rhythmic character of the division activity was due to some inherent factor within the living protoplasm. In regard to similar rhythms of growth in cleavage cells, Wilson† says, "During the cleavage the individual blastomeres are often found to exhibit entirely different rhythms of division, periods of active division being succeeded by long pauses, and sometimes by an entire cessation of division even at a very early period."

Rhythms of greater and less division activity seem, therefore, to be characteristic of living protoplasm when actively dividing and whatever the cause may be for the fluctuations, they appear to be perfectly normal growth phenomena.

But it is quite a different matter when we return to rhythms of so-called growth energy in cancer cells, for here, according to both the English and German observers mentioned, the rhythms occur in successive transplantations of the tumor material and involve the uncertain factors of infectiveness, natural immunity, change of soil, and the various conditions of the operations. To compare these rhythms of division energy the rate of growth in each individual tumor, and not in successive tumors should be ascertained, and this is apparently an impossible task. It occurred to me that Bashford, Murray and Bowen's use of the percentage of takes as an arbitrary index of growth energy when in conjunction with the period of growth, was inadequate and unfortunate in that it confuses the growth energy with another factor characteristic only of malignant tumors, viz., the power of infection. The growth energy or division energy is better indicated by the time factor alone for it involves no factor of infectivity while the drawbacks to its use, such as natural and variable resistance in different mice, are the same in both cases.

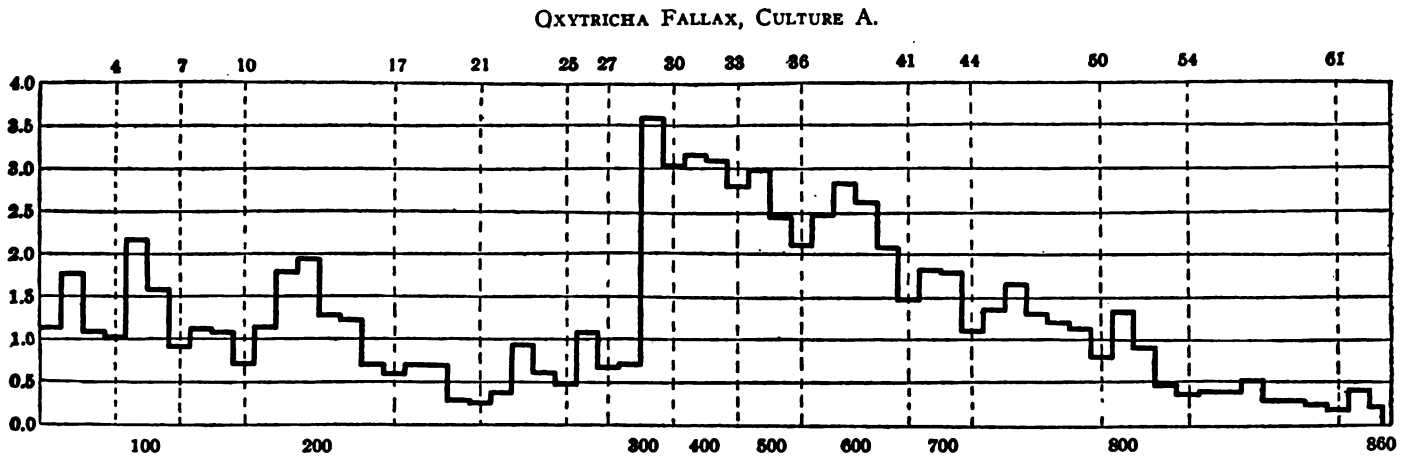
* L. L. Woodruff. Studies in the Life History of Hypotrichous ciliates. Jour. Exp. Zool. 2, 1905.

† E. B. Wilson. The Cell in Inheritance and Development. 1901. 2d ed. p. 389.

In a paper now in press I have made a study of the records of transplantations in our Brooklyn tumor* and have pointed out that the curves representing the infectivity and the growth energy of the cancer cells were quite independent of one another after the cancer cells had become accustomed to transplantation. It was shown, furthermore, that the rhythms of "growth energy" as described by the English pathologists, were not apparent in the curve indicating the growth energy when the time element alone was considered, but that the rhythms are well marked in the curve representing the infectivity. Diagram 2 shows the relations of these two curves for the Brooklyn tumor while Plate XX gives the curve for the same tumor made according to the method adopted by Bashford, Murray and Bowen. The history of the transplantations on which these curves are based shows that the growth energy is quite independent of the infectivity. This is best shown in the block curves where the two factors are contrasted. To make this diagram the percentages of takes for all transplantations of the same generation of transplants, were averaged and charted, the successive averages giving the curve of infectivity (solid line). Similarly the numbers of days required by all the tumors of any generation of transplantation to kill the mice were averaged, the successive averages giving the curve of growth energy (broken line).

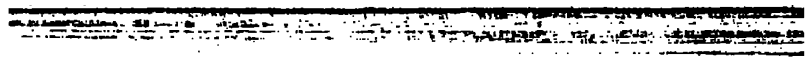
The most noticeable feature in these curves is that the first few generations of transplants show a clearly marked relationship between the two curves. As the line of infectivity, i. e., the percentage of takes, rises from eighteen to fifty-three, the line of division energy, i. e., the average number of days required to kill the mice, descends from 94 to 33. The usual method of expressing this fact is by the statement that as the number of days decreases the virulence of the cancer-cells or their infecting power increases, or vice versa, and this has been the experience of all observers. But when the curve of infectivity is once established, the variations of the growth energy have no effect upon it.

* G. N. Calkins. The So-called Rhythms of Growth Energy in Mouse Cancer. Jour. Exp. Med. X, 3, 1908.



OXYTRICHA FALLAX, CULTURE A.— DIAGRAM II.

Complete history of Oxytricha fallax, Culture A, from start (October 26, 1901) to extinction (July 14, 1903) in the 860th generation. Rate of division averaged from ten-day periods. The ordinates represent the average daily rate of division of the four lines of the culture. The broken lines designate the limits of the various *rhythms*. Above, the numbers of the ten-day periods which limit the rhythms are indicated; below, the monthsin which the rhythms chiefly fell. The figures, 100, 200, etc., represent generations and are placed in the periods in which they were attained. (Woodruff.)



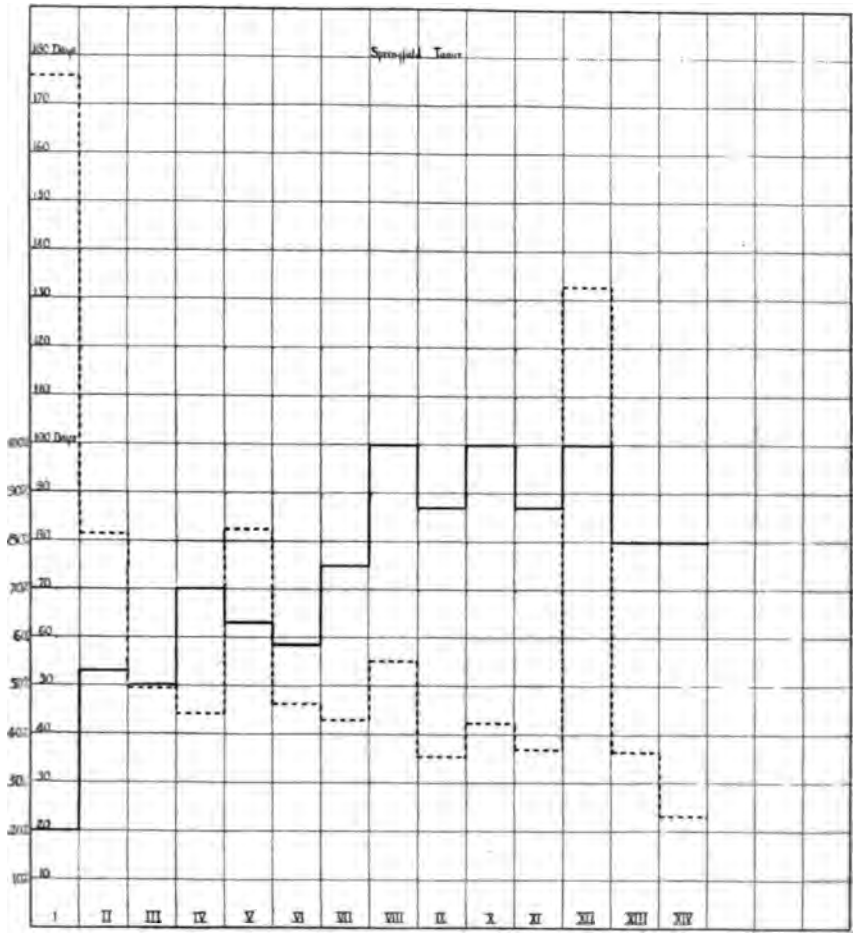
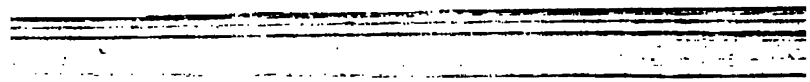


DIAGRAM IV.



This independence of the two factors is even more clearly shown in Diagram 4, representing the Springfield tumor, an adeno-carcinoma similar to the Brooklyn tumor. This is based upon the following statistics, the numbers of mice used being smaller than for the Brooklyn tumor.

GENERATION.	Total number of mice inoculated.	Dead in 10 days.	Total number tumors.	Killed for inoculation.	Dead from tumor.	Percentage of takes.	Average number of days.
I	*10	0	2	2	.....	20	176
II	17	0	9	5	4	53	81.5
III	26	0	13	3	10	50	49.6
IV	26	1	18	3	15	70	44.2
V	33	3	19	5	14	63	†76.0
VI	53	3	31	2	29	58.5	43.7
VII	12	0	9	1	8	75	43.0
VIII	6	0	6	1	5	100	55.2
IX	10	2	7	2	5	87.5	35.5
X	15	1	14	1	13	100	42.4
XI	8	0	7	3	4	87.5	37.0
XII	3	0	3	2	1	100	‡132.6
XIII	12	2	8	2	6	80	36.6
XIV	17	2	12	2	10	80	23.4

* Ten additional mice were also inoculated with normal cancer mush *not* incubated. No tumors.
† Cancer mush not incubated.
‡ Tumor material kept in abdominal cavity of a rat for six days prior to inoculation.

Here again, at the outset, there is a definite relation between the two curves of infectivity and growth energy. The long period of development (176 days) accompanied the low percentage of takes (20 per cent.) characteristic of the first transplantation of a primary tumor. The second transplantation shows a well marked rise in infectivity and a corresponding increase in the rapidity of growth, the curve representing the latter falling from 176 to 81.5 days. From this period the rhythms in infectivity become manifest but do not become well marked until the latter half of the curve, when the percentage of takes is at a maximum. Contrasted with this rhythmical curve of infectivity is that representing the time factor or rapidity of growth of the cancer cells. Here there is no evidence of rhythmic rise and fall, but with two exceptional rises, there is a fairly constant descent in the curve indicating the gradual reduction of the time factor to what is possibly a minimum of twenty-three days.

The two exceptions are interesting and significant. The first one in the fifth transplantation, was probably due to the fact that for the first time, the cancer material was not incubated prior to inoculation. The second exception, in the twelfth transplantation, was much more noticeable, the time required for the tumor to develop increased from an average of thirty-seven days to an average of 132.6 days. In this case the tumor material before inoculation was put into the abdominal cavity of a rat for a period of six days, then taken out and treated as ordinary cancer material is treated for inoculation. One of the tumors from this lot that had required 211 days to develop was used for inoculation in the regular way, the result being a number of tumors which developed rapidly, the average number of days required to kill the mice being 36.6 days, or the same, practically as in the transplantation immediately preceding that with the material from the rat. There is every reason to believe that the effect upon the cancer cells of the sojourn in the rat was to reduce the rate of division or to decrease the growth energy, although we have no evidence as to how this effect was produced.

The most singular feature in regard to these two exceptional cases is that no corresponding variations were produced in the curve of infectivity. Every mouse inoculated with the cancer mush developed a tumor. Nor did the treatment affect the ordinary course of the rhythms. It follows, therefore, from these various observations that in this phenomenon which Bashford, Murray and Bowen, under the head of the growth energy, regarded as a single factor in tumor growth, we have at least two component factors which are independent of each other to a certain extent. The same percentage of takes is maintained after the tumor is established, regardless of whether they are fast or slow growing tumors.

A word as to the number of cases on which these various averages are based. The larger the number of units the more perfect any statistical computation must be, and the value of deductions from such curves depends upon their perfection in this regard. In cancer work, however, it is manifestly impossible to carry out experiments on a great numerical scale, and in practice only enough animals are used to ensure the perpetuation of the tumor

This should be borne in mind in connection with any deduction that may be drawn from curves such as are here presented. For example, if a great number of mice had been used it is not probable that the percentage of takes would have reached 100, as given in the table and curve. Although the figures cannot be relied upon absolutely they may be sufficiently within the limits of error to give relative values. Thus the constancy with which the rhythms of infectivity occur in all strains of mouse tumors indicates a general biological phenomenon and not chance variations or variations within the limits of error. The conclusion that growth energy and infectivity are independent of one another, involving as it does a matter of considerable moment in cancer work, cannot be proved without much greater statistical evidence, but there is sufficient evidence, nevertheless, to indicate that such a conclusion is highly probable.

This conclusion is further borne out by a study of curves such as Bashford, Murray and Bowen presented. In these there is a certain advantage in being able to follow the vitality of cancer cells in different tumors of the same strain. Plate XX represents such a curve based upon the records of the Brooklyn tumor.

Transplantation of the primary tumor (1) was made May 30, 1905, the cancer mush being put into twenty-eight mice. None of these died inside of ten days, while five, or 18 per cent., developed tumors. One tumor suitable for transplantation developed in seventy-five days, while two of the cancer mice died. This tumor (2) was similarly teased and the cancer mush inoculated in the regular dosages, into thirty mice, of which three died inside of ten days and three, or 11 per cent., developed tumors. One of these tumors (3*a*) was ready for further inoculation in fifty-three days; a second (3*b*) and a third were ready in sixty-six days. These in turn were inoculated into different lots of mice of the fourth transplantation series, that lot inoculated with 3*a* giving 33 per cent. of takes, and that from 3*b* giving 25 per cent. The tumors from this second lot were used for further transplantations, the former for experiments and unsuitable for the present discussion. The mouse tumor designated 3*b*, giving 25 per cent. of takes upon reinoculation, developed four tumors which were ready for transplantation in thirty-nine, fifty-one, fifty-three and sixty-

four days, and they were inoculated in different batches of mice of the fourth series.

With the three transplantations which had been made up to this point the cancer cells had been growing from 180 to 200 days, and in this time there is a noticeable shortening of the period of development from seventy-five days after the first transplantation to thirty-nine days in the case of 4*a*, and fifty-three days in 4*b*. The increasing percentage of takes, combined with the shortening of the time of development, indicates that the cancer cells were becoming accustomed to the soil, to use Bashford's expressive term, of the different host mice, and were gaining strength with each new transplantation. That they were not yet perfectly adapted, however, is indicated by the fact that the tumors which developed upon the fourth transplantation were not equally established, some dying out altogether within two subsequent transplantations, while others gave rise to highly virulent cancers. Thus 4*c* inoculated into a batch of mice produced only 18 per cent. of takes (5*b*), and these required forty-one days, while the same strain upon reinoculation into the sixth series, produced only 4 per cent., after which the strain died out entirely. Tumor 4*b* had a more remarkable history for some of its cells were apparently endowed with a very high, and others with a very low, potential of vitality. This tumor, upon inoculation into the fifth series, produced only 15 per cent. of takes (5*f*), a marked decrease, but one of the tumors which developed in a short period of twenty-three days (5*f*), gave rise to a most malignant strain running up to 100 per cent. of takes in the twelfth transplantation (12*a*), while another tumor (5*c*) from the same source (4*b*) required sixty-four days and was comparatively feeble, for, upon reinoculation into the sixth series, it gave only 4 per cent. of takes. It is seen, therefore, that at this early period of transplantation, the same tumor may give rise to a highly virulent strain, or to a weak strain, showing that the cancer cells are not fully adapted to new soils. Of course there are always two factors to take into consideration, one is the division energy of the cancer cells, the other, the natural resistance of the host into which such cells are inoculated. It is not improbable that the batch of mice into which 4*b* was transplanted had a relatively high protective reaction, so that the division energy of

the cells as a whole was restrained, but the rapid growth of 5*f* shows that here was a mouse in which no such restraint was manifest, the natural resistance must have been weak or else the particular nutritive conditions must have been suitable, for the cancer cells acquired a high potential of activity. Tumor mouse 4*d* must have been similar to 5*f* in this respect, for the same cancer cells upon reinoculation into the fifth series, now gave 80 per cent. of takes (5*d*, *e*), as against 15 per cent., and in periods ranging from thirty-four to forty-two days.

The further history of the Brooklyn tumor is the working out of these two lines of development, one from 4*d*, the other from 5*f*, and in both strains the characteristic rise and fall in rhythmic change is well shown in the curve. The high percentage of takes from 4*d* is continued in the next transplantation, 5*d* alone being used as the others were taken for experiments. This tumor, upon inoculation in the sixth series, gave 77 per cent. of takes in the short periods of twenty-five (6*b* and *c*) and forty-three (6*a*) days. After this, however, the infectivity declined for these tumors upon inoculation into the seventh series, yielded only 60 per cent. (7*b*) and 33 per cent. (7*a*) in thirty-three and thirty-six days, respectively. The latter (7*a*) upon reinoculation, however, shot up again to 80 per cent. in the eighth series and in twenty-six days, thus marking a definite rhythm.

The history of tumor 5*f* is more interesting and is marked by a series of rapid growths and by a gradually increasing percentage of takes. It was transplanted into nine mice, of which two died in ten days, while in the others two, or 28 per cent., developed tumors. One of these died from the cancer; another (6*c*) had a transplantable tumor in seventeen days, and this, when transplanted into twenty mice, yielded 65 per cent. in twenty, thirty-nine and eighty days. In the latter case (7*d*) there is considerable evidence to show that the tumor was held back by the resistance of the mouse host, for the malignancy of the same tumor material was shown by the rapid growth of 7*c* and by the fact that 7*d*, when transplanted into a new batch, gave rise to 77 per cent. of takes and all within twenty-eight days (8*b*, *c*).

At this period in the history the curve becomes complicated through the massing of strains but they all show a certain optimum

of development followed by a fall and this by a renewal of growth. The tumor 7*c* is a good average example; this, when transplanted into series eight gave 88 per cent. of takes, some (8*c* and 8*d*) in twenty-one days, one (8*b*) in fifteen days (8 ?) in twenty-six days. None of the mice inoculated died within ten days. The history of this set of tumors varies somewhat in the different cases; in some the divison energy of the cancer cells decreased immediately, in another it decreased only after the following transplantation. Following out the history of 8*c*, we see from the diagram that upon reinoculation into a fresh batch of eleven mice, none died within ten days while seven, or 80 per cent., developed cancers, 9*d*, in thirteen days, 9*e*, in twenty-four, two others in thirty-eight and two in forty-one days. Many of these were used for experiments, but two of the rapidly growing ones were transplanted (9*d* and 9*e*). In both cases there was a marked decrease in the division energy of the cancer cells: 9*d*, which had developed very rapidly (thirteen days), was transplanted into six mice of series 10, one of which died within ten days, while only two tumors, or 33 per cent., developed, these requiring twenty-five days. One of these two (10*e*), upon reinoculation into fresh mice of series 11, gave rise to 61 per cent. of tumors, two of which (11*f* and 11*g*) were used for experiments, the first developed in twenty-nine days, the second in seventy-seven.

Turning back to 9*d*, which had the same ancestry as 9*e*, there is the same evidence of depression in the energy of the cancer cells coming from 8*c*. Tumor 9*d* was transplanted into sixteen mice, of which six died within ten days, while 66 per cent. developed tumors, of which the great number were used for experiments, all developing within thirty-one days. One (10*a*) was used for further transplanting into series 11; it was ready for inoculation in nineteen days, and was put into twenty-six mice of series 11. Of these four died within ten days, while ten, or 43 per cent., developed cancers, 11*c* in eighteen, 11*a* in thirty days. 11*a* was inoculated into ten mice, of which eight, or 80 per cent., developed tumors. Its history, therefore, is identical with that of 10*e* except that it was one generation behind the latter. There is the same lull in the division energy and the same recovery, and the same rhythm in infecting power.

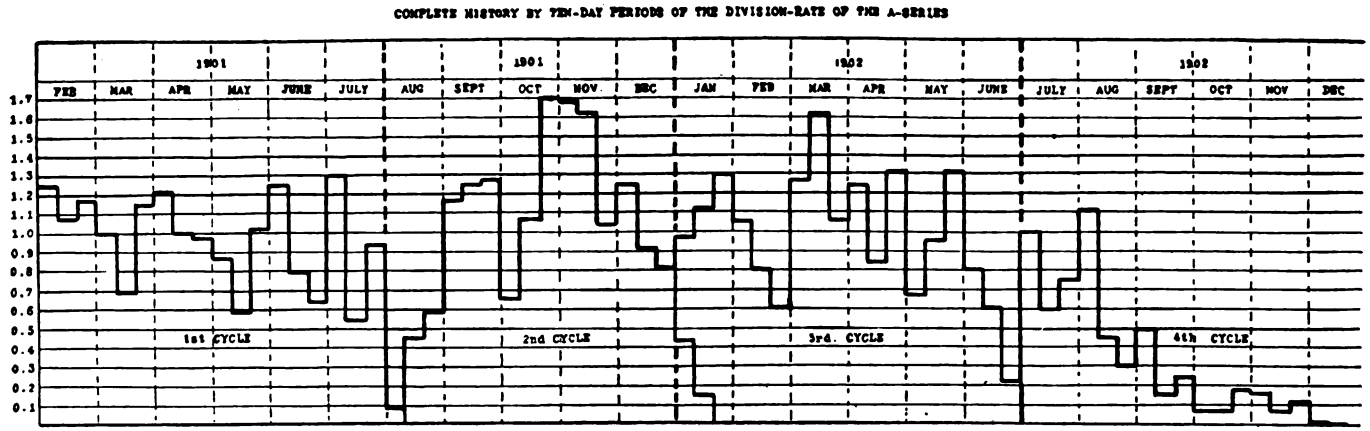
All of the tumors described are to be traced back to tumor 8*c*, which came from the cancer cells in 7*c*. A very similar history is shown in the case of tumors coming from 8*b*, likewise derived from 7*c*. Here again the general result is a high percentage of takes with short periods of growth, or in general, a high virulence of the cancer cells. 8*b* was developed and ready for transplantation in fifteen days when it was put into twenty mice of the ninth series; none of these died within ten days, while eighteen, or 90 per cent., developed tumors, many being used for experiments of one kind or another, while four were transplanted into batches of the tenth series. The periods of development of the thirteen tumors were for the most part relatively short; 9*a* and 9? requiring only fourteen days, two others eighteen days, 9*b* and 9*c*, twenty days, three others, twenty-three, others, thirty, thirty-four and forty-four days, respectively. Of these 9*a*, 9*b* and 9*c* were used for further transplantation and their histories are remarkably similar. 9*a*, when inoculated into mice of the tenth series (10*d*), gave 75 per cent. of tumors which required from twenty-five to forty days to develop, and these tumors were used for experiments. 9*b*, when transplanted, gave a small percentage (43 per cent.) of takes (10*f*). There was, therefore, a well marked decline in the division energy of the cancer cells and the one tumor to develop required twenty-eight days and this, when transplanted into another batch of mice, caused their death inside of ten days. Of this ninth series, the tumor marked 9*c* was the most successful and also the most remarkable; it was transplanted into thirty mice of the tenth series, of which three died within ten days, while twenty, or 80 per cent., developed cancer in from fourteen to twenty-seven days, all rapidly growing tumors, two of which (10*b* and 10*c*) are given in the curve, the former developing in fourteen days, the latter in twenty. Each of these tumors, when transplanted into new lots of mice of the eleventh series, gave reduced percentages of takes. Tumor 10*b* fell to 62 per cent., 11*b* and 10*c* to 70 per cent. The progeny of 10*c* were used for experiments, while 10*b* was used for further transplantation. It was put into twenty-four mice of the eleventh series, of which none died, while fifteen, or 62 per cent., developed tumors as follows: 11*b* in seven (sic) days, another in twenty-four,

11*d* in twenty-six, others in twenty-seven, twenty-nine and thirty-two days, respectively. Of these tumors only 11*b* and 11*d* were used for further transplantation, the others going into experiments. Here, however, 11*b* is of especial interest, for upon inoculation into six mice of series twelve, 100 per cent. developed tumors (12*a*). Of these, one recovered spontaneously, while the others, when inoculated into new batches of mice, caused the death of all the latter within ten days (?). This malignant strain was thus brought to a speedy end.

The other strain from 10*b*, carried in mouse 11*d*, had a better fate. It was a more slowly growing tumor, requiring twenty-five days to develop. This tumor, upon transplantation in sixteen mice of series twelve, gave rise to 94 per cent. of takes in from twenty to twenty-eight days. Most of the resulting tumors were used for different purposes but one, 12*b*, which required twenty-five days, was again transplanted into thirty mice of series thirteen one of which died and 65 per cent. developed cancer in periods varying from twelve, fourteen, eighteen, twenty-three and thirty-one, to ninety-four days. Most of these were not followed up, one only, thirteen, which required thirty-one days, was transplanted into eight mice of the fourteenth series, giving 66 per cent. in long periods of development (fifty-five to sixty days).

Anyone who follows through these tedious details will see that the cancer cells contained in the tumor-bearing mouse, 7*c*, all had the same history of high proliferative energy followed by a decline. In all cases followed out, this decline is followed by a sharp rise in division energy and in the percentages of takes. Sister cells of tumor 7*c* formed the tumor in 7*d*, but required a much longer period (eighty days) to develop. Although slower, these tumor cells had a high potential of division energy, as shown by the fact of high percentages and quick periods in the eighth and ninth series. The tenth series, like the tenth series in the allied strain, brought a decline, thus marking for this strain a similar rhythm of growth energy.

The further history of the transplantations needs no special analysis; as the curve clearly shows, there is a continuation of the rhythms of infectivity, the average of which remains high, while the time element becomes much longer, until the curve now



COMPLETE HISTORY BY TEN DAY PERIODS OF THE DIVISION OF THE A SERIES.— DIAGRAM I.

History of the A Series from start (Feb. 1, 1901) to finish (Dec. 19, 1902) by ten-day periods (three periods to each month). The ordinates represent the average daily rate of division. The heavy dotted lines indicate the limits of the several cycles, and the lines of the curve carried to the base indicate that the individuals that were not stimulated by change of diet died out. The points at which such lines leave the curve indicate the time of the successfully changed diet.



the aspect of having been pulled out at the ends and concen-
ed in the middle.

t is hardly conceivable that this rhythmic development of the
cer cells is only artificial, due, that is, to the fact of inocula-
ı into particularly susceptible mice, of which, according to
hford, young mice offer the best examples. Such an explana-
might be satisfactory for one or two instances of the phe-
ienon, but recurring regularly as it does, the phenomenon
ıably signifies something fundamental. In a developing
ryo the rhythms of growth energy of the individual cells do
indicate a cessation of growth for the organism as a whole,
while some of the cells are resting others are dividing and
loping. The energy of growth is applied sometimes in this
ɛtimes in that group of cells. In cancer, however, there is
the one type of cells to develop, and appearing in different
hes of mice the phenomenon cannot be attributed to the source
utriment of the cancer cells, but must be looked for in the
themselves. As previously stated these cells must be re-
ed as complete organisms, satisfying all of their physiologi-
need through their own physiologically balanced activities.
source of the alternating rhythms must, therefore, be sought
he cells. In other and possibly analogous cases of complete
ılar organism the cause of the alternating periods is looked
in the variation of the physiological activities. Thus in the
mecium experiments already mentioned, high division energy
ıe individual cells is followed by a gradually lowering rate
ivision until it is reduced to nil. At such periods it was
d that the cells could not reduce the highly stable condition
ıe protoplasm to a more labile condition, and that they evi-
ly lacked the power of oxidation, or of forming the oxidative
mes. This condition was relieved by the use of certain salts
ıg as stimuli; by them the labile condition was reëstablished
divisions in rhythmic waves of vigor again ensued (see Dia-
ı).

ı the *Paramecium* there was nothing to interrupt the dividing
ity of the organism save the ordinary course of vitality. With
ancer cells there is always the struggle to maintain an exist-
against what must be adverse conditions. The division en-

ergy of the cells is retarded by such conditions, a result best shown in the early periods of the transplantations before the cells became adapted to the strange soil. The same phenomenon is manifest in the culture of *Paramecium*, a few days being required for the cells to become adapted to the culture medium. They seem to survive well enough in the medium, but they do not divide with such regularity during the first few days as afterward when well established. The difference is due to the density of the fluid medium in which the organism finds itself rather than to any change in food. And so it may be with the cancer cells; they have the same source of food in the new mouse to which they are transplanted, but the environment is a little different and it requires some time for them to get started. Once started, however, there seems to be but little change in their potential of infectivity, although the periods of development differ to some considerable extent, the difference probably being due to the protective reactions on the part of the host mice. This is shown well in Diagram II where the periods of development in days are contrasted with the percentages of takes in the different transplantations from start of the tumor to the present. The plotted curve shows that as the number of days required for development in the successive periods decreases, the percentage of takes increases with great regularity, until, when once established, it is maintained regardless apparently of the length of time required for development. This fact indicates that the cancer cells are endowed with a like power of infection, but that the host animals exert a retarding influence upon their development. All cancer cells cannot be expected to develop, hence it is too much to expect 100 per cent. of takes all the time; those cells maintain their existence which are endowed in the parent tumor with the most advantageous equipment for growth. This is not to be expected in imperfect cells, or in degenerated cells, but in those having the full complement of cell organs, normal number of chromosomes, division energy and the like. The success of such cells may be compared with that of the gametocytes of the malaria organisms; these are endowed with some property through which they are able to withstand the digestive fluids of the mosquito's gut, while all other forms of the malaria organisms are digested. So with the cancer

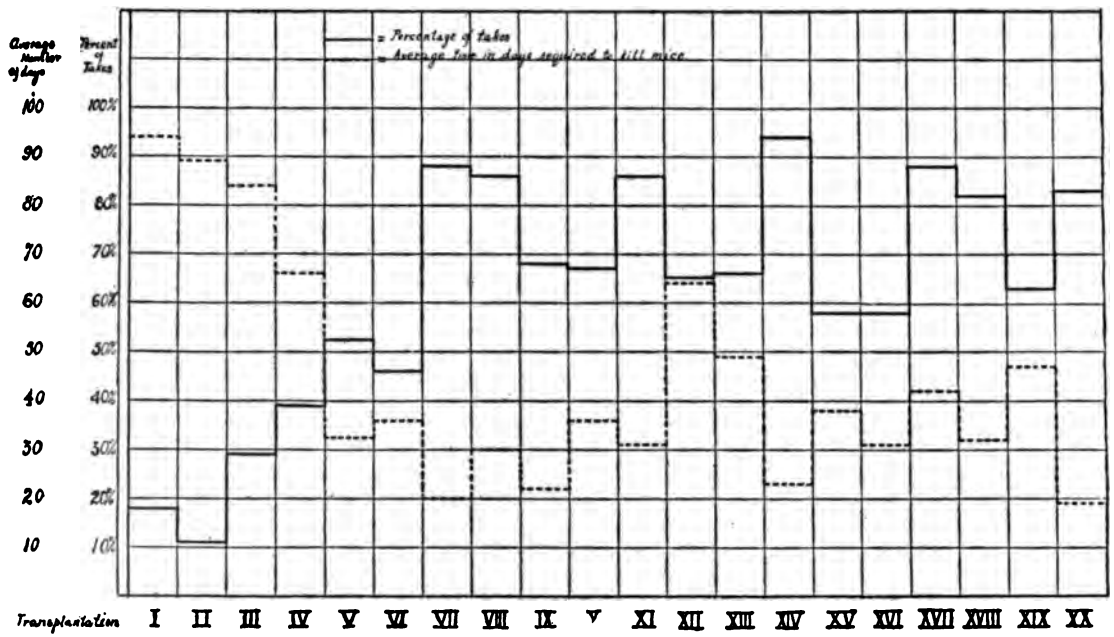
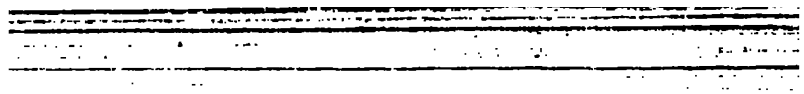

Average number of days
Percent of Takes
= Percentage of takes
= Average time in days required to kill mice
100
90
80
70
60
50
40
30
20
10
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
Transplantation
I
II
III
IV
V
VI
VII
VIII
IX
V
XI
XII
XIII
XIV
XV
XVI
XVII
XVIII
XIX
XX

DIAGRAM III.



cells those persist which have the proper attributes and these attributes are apparently developed with some degree of periodicity. Is there any evidence to indicate the nature of these particular attributes?

The cancer cell gets its nourishment as do other epithelial cells; there is little evidence to support the belief of Ehrlich that they make use of a specific *Nahrsubstanz,* although they are undoubtedly so modified as to take up more nourishment. They are bathed by the same fluids, they are subject to the same general conditions of metabolism as other epithelial cells. Other epithelial cells, however, do not multiply beyond the limits of organic regulation; these cells do and they are cancer cells because of this power. Other normal epithelial cells, beyond one or two divisions, do not multiply upon transplantation into other mice. The cancer problem, therefore, has to do with the specific attribute which distinguishes the cancer cells from these other epithelial cells, and we are again brought back to the question — what is the origin or source of the stimulus which causes this infectivity combined with the increase of the division energy? The conditions of the environment of cancer cells in new batches of mice cannot account for the stimulus to continued development in successive transplantations; if this were true the percentage of takes and rapidity of growth would be quite as extensive on the first transplantation as in the later ones, for this would be the anticipated result if the cancer cells have that vigor of growth which should accompany them if they were embryonic tissue cells, or cells recently stimulated by some initial stimulus, or cells recently fertilized. The cancer cells must carry with them the sources of their stimuli, and these stimuli must be the same, both in the primary tumor and in the continued development of that tumor's cells, for we cannot conceive that each new batch of mice into which the cancer cells are transplanted provide the same identical physiological conditions as those of the first mouse in which the cancer was a primary tumor. Furthermore we cannot conceive any reason why, if the proper physiological conditions were present, there should be rhythmic variations in their production in different sets of mice, hence the conclusion is forced that the

source of the stimulus to development is within the cancer cell itself.

In the entire realm of biology there are few analogues to this condition of affairs. The favorite hypothesis of the medical profession — the Cohnheim theory of embryonic tissue rests as the cause of cancer, cannot stand the biological test. Leaving out of consideration that entirely unexplained set of questions having to do with the position and conditions of such cells during the periods of growth and maturity, the cancer cells, after the tumor is started, have none of the attributes of embryonic cells. Mere power of proliferation is not a sufficient characteristic, while the fundamental characteristics of embryonic tissue cells are usually entirely ignored by the advocates of this theory. These conditions are somewhat more subtle than are the ordinary manifestations of vitality, but they are none the less potent. I refer to the properties which all embryonic cells have of differentiation combined with coördination, self-regulation and adaptation. Cancer cells have none of these; there is no evidence of differentiation although mountains of mouse tissue have been grown from the cell progeny of that original Jensen mouse. The absence of any regulation and of all coördination and of adaptation to the needs of an organism as a whole which is the goal of all embryonic cells, is evidence against the hypothesis. All of these factors are characteristics of embryonic cells, and to the biologist they are the most important and the most characteristic. No theory of embryonic tissue satisfies the conditions of increased vitality and vigor of growth shown by this Jensen tumor, and we must look in other directions for its origin.

Nor can the tumor origin be traced to any detached cell, which, freed from its supporting and regulating membrana propria, starts off on an independent career of lawless development. This theory of Ribbert's postulates the metamorphosis of an ordinary epithelial cell into a parasite endowed with a potential of indefinite vitality and development. It does not account for the origin of the detaching force, nor for the origin of the stimulus to the latent division energy, much less does it account for the perpetuation of that stimulus. Here, too, lies the difficulty with the theory of chemical stimulation which Marchand has elaborated. There is no evidence that an initial stimulus can continue to act

in this direction indefinitely, the impetus given soon wears off, and the gradually increasing vigor of a tumor like that of the Brooklyn mouse, is evidence quite strong enough to indicate that the stimulus, whatever it is, acquires strength rather than loses it.

The summation of the evidence, finally, shows that the cancer cell carries with it into each new mouse into which it is transplanted its own stimulus to division. Furthermore this stimulus cannot be an integral part of its own protoplasm, nor created by it as a product of its own metabolism; the very definition of a stimulus involves the idea of an external origin. We are thus driven back into the last resort of a biologist or pathologist, to the suggestion that *the cause of the division energy lies in the stimulating poison from some self-contained and ordinarily invisible micro-organism whose rhythmical variations in vitality may, possibly, account for the rhythmic variations in infectivity.*

In this connection we find one of the very few analogues of cancer cell growth, the formation of a vegetable gall where the latent division energy of the plant cells is stimulated to renewed activity by a poison secreted by an insect. As often pointed out, however, this is only a far-fetched analogy, for the stimulus comes to an end, and the division energy wears off. A more significant case is the formation of tumors on the roots of certain plants like the cabbage and its allies. Here, in club root, the parenchyma cells of the root are entered by a minute protozoan parasite. The organism multiplies in the cell protoplasm, which reacts to the stimulus of the parasite's presence, and divides. The division is repeated until great tumors are formed, parasite and protoplasm meantime living amicably together in symbiosis.

As all attempts to explain the cause of cancer must at the present time be of the nature of tentative or working hypotheses, the suggestion that an ultra-microscopic or unrecognized organism is not out of place, the value of an hypothesis being measured by the number of phenomena which it accounts for. The old arguments in favor of the parasitic theory of cancer, familiar to everyone conversant with the subject, apply in the present case. Cage infection, early noted by Borrel, observed by Giard, Ligniéres, Michaelis, in the Buffalo laboratory, etc., finds its interpretation n such an hypothesis. The infectivity of cancer cells, a phe-

nomenon by which these cells differ from ordinary epithelial cells treated in the same way, is added evidence which finds a counterpart in the tumors of club-root type. Contrasted with these are tumors like vegetable galls, benign tumors and teratomata of man, in all of which there is a well-defined division energy of the cells involved, but no infectivity on the part of these cells. In club root and in cancer, division of growth energy is accompanied by clearly defined infectiveness. In club root infectivity is due to a contained parasite, and the growth energy is attributed to the stimulus from that parasite.

In cancer we have found no parasite confined exclusively to cancer tissue, but analysis of the growth energy and the phenomena of transplantation give evidence to show that infectivity and division energy of the cancer cells are not one and the same thing and that each has its own variations. The growth energy or division energy of the cancer cells, measured by the periods required for growth in successive batches of mice, affords no evidence of rhythmic development such as we find in embryonic cleavage cells or in free living organisms like the protozoa; there is, in all probability, such a rhythmic growth but it must take place in the individual mouse if at all. The infectivity, however, shows a regular rhythm which cannot be attributed to the reactions of mice in batches or lots of varying number, but this periodicity may be explained as the regular variations in vitality, similar to those of paramecium, oxytricha or tillina of a parasitic organism.

It is frequently noted that a strain of cancer cells giving a high percentage of takes (for example 11*b* of Diagram) upon inoculation in fresh batches causes the death of all of the mice within a period of ten days. Such cases cannot be traced to the division energy of the cancer cells, but to the infectivity, and possibly to a parasite.

Many parasites have been assigned to the human cancer cells. Protozoa of all types have been held responsible by one or more investigators, but in no case have the claims been made good. The various morphological products of epithelial or blood cells that have been called parasites have served only to weaken the hypothesis of the parasite origin of cancer, which, with its power

of indefinitely continued proliferation is a very different thing, biologically, from a benign tumor.

It is certainly conceivable that a parasite of cancer may be too minute to be seen with the technique at our disposal. At the present time we know a great deal about the yellow fever organism; we know the period of incubation it requires in the human blood; we know that it requires from twelve to fourteen days to develop in the body of a mosquito before the latter is able to transmit the disease; we know that the disease cannot be transmitted in any other way, and yet, knowing all of these things, the organism of yellow fever has never been seen. It will pass through the finest filters, and belongs, therefore, to a group which we must perforce, until they are actually seen, consider as ultra-microscopic organisms. Such parasites might be adapted to life in the epithelial cell as well as the organisms of club root are, and there in the protoplasm might easily be overlooked. It has been suggested that a species of *Spirochæta* is responsible for yellow fever, and spirochætes have actually been seen in the kidney of yellow fever victims. But they apparently do not exist as such in the blood or in the mosquito. We know nothing about the life history of the spirochætes as a group; if it is analogous to the life history of most protozoa we might well look for stages in which it is of ultra-microscopic size.

We continually find spirochætes in mouse cancer and it is not improbable that we attach too little importance to them. We find furthermore a certain relation between the virulence of mouse cancer and the numbers of spiral organisms present; in highly virulent strains the tissues are infested with the parasites and it is not beyond reason to assume that the rapid death of batches of mice inoculated with virulent cancer cells is due to these spirochætes. Nor is it inconceivable that the parasites increase the susceptibility or prepare the soil, so to speak, in a new host for the growth of the cancer cells. On the other hand, the same or a very similar spirochæte is found in mice not infected with cancer, a fact which weakens any theory that the spirochæte is the direct cause of cancer, although the fact is not fatal to such a theory. A more serious objection is that no spirochætes are found in human cancer, but the objection might be met with the argument that spirochætes may have been present at the outset to prepare

the soil and to provide the stimulus to the potentia
energy; furthermore, we do not know that human canc
plantable. The rhythms of infectivity, finally, may
the variations in vitality of these spirochætes.

SUMMARY

In conclusion we may summarize the above biological
tions in a series of these as follows:

1. Cancer cells differ from other epithelial cells in r
(*a*) Size relations of nucleus and cell body; (*b*) power
nitely continued division.

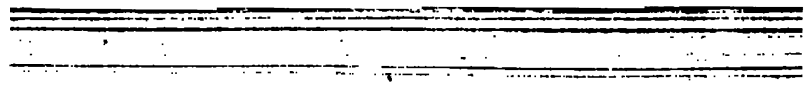
2. Cancer cells differ from embryonic cells in absenc
power of differentiation: (*b*) power of adaptation and
tion of parts to whole; (*c*) power of self-regulation and
growth.

3. The continued development of the cancer cells is
the following factors: (*a*) The inherent potential of di
the cancer cells. (*b*) The natural resistance of the i
animals. The latter factor is usually regarded as the ind
lignancy of a tumor and is based upon the percentage of
gether with the period required to kill the mice. Ou
ments, however, show that the percentage of takes is inc
of the time factor, and indicate the presence of a thi
which may be described as (*c*) the potential of "infect
the cancer cells.

4. The potential of infectivity of cancer cells is cha
by more or less regular rhythms; these must be dist
from rhythms of growth energy of the cancer cells whi
probability occur within the individual mouse. Witho
vision energy of the cancer cell this infectivity is inc
hence it follows that the cause of the infectivity lies w
cancer cell or is constantly associated with it.

5. Cancer cells differ from epithelial cells by virtue o
tential of infectivity combined with that of division
There is no reason to doubt that the latter is due to the
stimuli and not to the liberation of a restrained grow
of embryonic tissue. There is reason to doubt that
discontinued stimulus is responsible for these attr





cancer cells. Some types of benign tumors, and vegetable s, may be due to the action of such initial stimuli, but in them e is no infectivity. Teratomata, due to embryonic cells, have igh power of differentiation combined with their division rgy, but there is no infectivity. Infectivity distinguishes all cerous growths from normal epithelium and from benign ıors or teratomata.

. The rhythms of infectivity of cancer cells, erroneously re-ded as rhythms of growth energy by Bashford, Murray and ven, appearing as they do in successive batches of mice which may legitimately assume to have like powers of resistance, must e their cause in the cancer cells themselves. These cells, there-, must be equivalent to parasites, or else parasites are con-ed within or associated with them.

Upon any other hypothesis it is difficult to conceive of cells ting a continual internal stimulus to their own growth energy. equally difficult to conceive these cells creating such a stim-*inter se,* and it is still more difficult to explain the rhythms ıfectivity.

Many lines of evidence point to the presence of some possible nism within the cancer cell; some organism which, acting as *Plasmodiophora brassicæ* within vegetable cells, underlies the ctivity of cancer cells and provides the stimulus for their con-ed proliferation. Upon such an assumption the numerous s of cage infection find their explanation.

The various inclusions of the cancer cell which have been ribed as organisms have been disproved; yet the analogy of root and the many filter experiments show that the cause of ction may lie within the cancer cell. It is conceivable that, yellow fever organisms, such an incitant may be in the proto-m and beyond our powers with the microscope to locate.

). The spirochætes which we have found in mouse cancer may e something to do with this infectivity of cancer cells. They be useful in preparing the "soil" in new mouse hosts and ing it susceptible to cell growth; or they may have intracellular es in their life history which are too minute to be seen. The hms of infectivity, finally, may be an expression of the vi-y of these spirochætes or of the hypothetical ultra-micro-ical *organisms accompanying* cancer cells.

A SPIROCHETE IN PRIMARY AND TRANSPLANTED CARCINOMA OF THE BREAST IN MICE*

HARVEY R. GAYLORD, M.D.

In the early spring of 1905 the writer first observed in the epithelium of a retrograding transplanted tumor of the Jensen series, certain curious structures which were the subject of a publication by G. N. Calkins and G. H. A. Clowes under the title "Some Artefacts in Mouse Carcinoma."[1] The material in which the structures in question were first seen was hardened in an excess of mercury and contained, besides the structures about to be specified, curious deposits in crystalline form, both intra- and extra-cellular. The structures which attracted our attention at that time were very fine filaments of varying length, frequently possessed of clubbed ends, located in the protoplasm. They are illustrated by Figs. 5 and 6 of Plate 17, and by drawings by Calkins in Figs. 6, 7, 8, 9, and 10 of Plate 18.

The first impression which we had of these structures was that they must be some sort of parasitic form as yet unrecognized, but our inability to distinguish them from the deposits of mercury in the surrounding tissues, and in the nuclei and protoplasm of the cells of the tumor, led to the conclusion by Calkins and Clowes that they were artefacts, and the specimen was thereupon described and published.

So deeply impressed was the writer that certain of these forms must be parasitic that he never abandoned that point of view; and that Clowes and Calkins were also of the opinion that the bodies represented unusual structures impregnated with mercury is shown by the following sentence in their publication, on p. 559: "While these deposits are to be interpreted as artefacts, the fact must not be overlooked that something of an unusual nature is present in these cancer cells and tissues, upon which the salts of the fixing agent work in forming the deposits of various kinds."

Being deeply impressed with the possible significance of these curious filamentous structures in the vacuoles of the cells of the

* Received for publication, March 12, 1907.

[1] *Jour. Infect. Dis.*, 1905, 2, p. 555.

transplanted mouse tumor, and having made various attempts to find a method which would better demonstrate them if present, the writer at once saw, on the publication of Levaditi's article,[1] a close resemblance between these filamentous structures and the involution forms of *Spirochæta pallida* so frequently encountered in syphilitic tissue. Thereupon a systematic investigation of all the transplanted mouse tumors in the State Cancer Laboratory was undertaken by the Levaditi method. The results of this systematic examination are here reported.*

An examination of transplanted tumors from three separate strains which are at present in existence in this laboratory has shown the constant occurrence of a characteristic organism in the transplanted tumors of each. The tumors from which these strains are derived are first the famous Jensen, which is now, in our hands, in its twentieth generation; a very virulent tumor known as the Brooklyn tumor, in its twentieth generation; and a less virulent tumor, known as the Springfield tumor, in its twelfth generation. All three of these tumors are carcinomata of the breast. They present practically identical characteristics, being carcinoma solidum, with occasionally adenomatous types.

The tumor known as 3^{10}, in which the original threadlike structures impregnated with mercury were discovered in March, 1905, belongs in the second generation of the Jensen strain. We have examined by the Levaditi method 914 E, 914 G, 915 A, and 915D, out of the fourteenth generation of this tumor. All of these transplanted tumors were movable beneath the skin and uncontaminated. At the margin of the tumors in the Levaditi sections is found in the immediate neighborhood of the infiltrating edge of epithelium, a small spiral organism from 2.5 to 7.8 μ in length, with from four to as high as 13 or 16 nodes or corkscrews. The organism is 0.6 u in average width; the ends are slightly rounded, and there is no evidence of an undulating membrane or flagellum.

[1] *Ann. de l'Inst. Pasteur*, 1906, 20, p. 41.

* The title of this paper was on the program, but it was not read, at the meeting of the British Medical Association in Toronto, August 22, 1906. The facts in substance were presented at a meeting of the Academy of Medicine in Cleveland, January 11, 1907, and before the State Medical Society of New York at Albany, January 29, 1907.

Of the Springfield tumor 900 F, 921 F, 921 H, from the sixth generation, were subjected to the Levaditi method. An organism was found at the margin which was identical in appearance with that found in the Jensen tumors, bore the same relation to the epithelium, and was distributed in the same manner.

Of the Brooklyn tumor 741 A from the ninth generation, 763 E eleventh generation, 918 G thirteenth generation, 904 K thirteenth generation, 935 H fourteenth generation, 918 C fourteenth generation, 1039 E fifteenth generation, 1088 C sixteenth generation, 1113 A seventeenth generation, were examined by the Levaditi method. In every section of every one of these tumors the same characteristic spirochetes were found as described in the Jensen and Springfield tumors. These were in great numbers about the margin of the tumor in the connective tissue immediately adjacent to the epithelium. The organism is also occasionally found in the stroma or between the epithelial cells through the substance of the tumor, but the characteristic distribution is in the zone of round-celled infiltration and between the epithelial cells at the infiltrating edge of the tumor. Some of the larger of these tumors showed in their centers the usual areas of necrosis. A careful examination of these areas of necrosis failed to show the presence of any microörganisms of any kind.

Having determined the practically constant occurrence of this organism by the Levaditi method, attempts were made to stain it by Giemsa, by the various flagella stains, or by Wright's method, all without success, although the material which was used was known to contain large numbers of organisms. The organism could, however, be easily detected in fresh material. It is rather difficult to see because of its low refractive index and the high refractive index of the fluid portions of the tumor. Patient search has, however, in every instance in which fresh material has been examined, demonstrated well-defined, actively motile organisms. Measurements made of these fresh, living organisms correspond with those made of the hardened organism in the Levaditi sections. Dr. F. G. Novy, who examined for me a fresh preparation from an uncontaminated mouse tumor, made the following measurements: From 2.5 to 7.8 μ in length and from 4 to 13 turns.

The proper position of this organism and a more definite description of its characteristics have been kindly undertaken by Professor Calkins.

Having determined the constant occurrence of a living spirochete in all of our transplanted mouse tumors, it was of the greatest importance to discover with what frequency they could be found in unattached, uncontaminated primary mouse carcinomata. We have up to the present time examined ten primary mouse carcinomata. One of these was badly impregnated, so that it was impossible to determine the structure of the tumor satisfactorily, and it was therefore excluded. Of the remaining nine, the organisms have been found in all. They were found with no difficulty whatsoever in five. These are known as G-7, G-E, G-A, G-C, Springfield No. 8, and Buffalo I. In the tumors known as G-10 and G-8 the impregnation was imperfect and the organisms were of a pale brown, but could, however, be definitely distinguished. Tumor G-D was large and on its superior aspect slightly attached to the skin. The greater part of the central portion of the tumor was necrotic; only a very narrow margin at the periphery of the deeper portions of the tumor was in a state of active growth, and in these regions the organisms, although few in number, could be easily found.

It is to be noted that all of these tumors, with the exception of G-D and Buffalo I, were freely movable beneath the skin and small. All the G tumors were obtained at different times from a dealer in Massachusetts, whose animals are frequently affected with carcinoma of the breast. We have received from this dealer, in the course of the last eight months, thirty-one tumors. The tumor designated Springfield 8 was a small primary tumor obtained from a dealer in Springfield, Ohio, who has furnished us with three tumors in the last year and a half. It is from this dealer that we have obtained a cage from which in the course of three years have been taken over sixty mice with carcinoma of the breast. The cage with its contents was brought to Buffalo, and since its arrival at this laboratory five mice with cancer of the breast have been removed from it. Both of these series of tumor mice have been previously reported.[1] The Buffalo I tumor was

[1] *Jour. Amer. Med. Assoc.*, 1907, 48, p. 15.

found in a cage of pet mice in the home of a Buffalo physician. To these must be added a primary cancer of the breast found by Calkins in a mouse in his laboratory at Columbia University, New York, which contains the organism.

For control of the work up to this point we have impregnated and sectioned pieces from all the organs and subcutaneous tissues of five supposedly normal mice. A prolonged search of all these tissues has given negative results, but more extensive controls will be necessary before the distribution of this organism, which obviously must be very wide, can be defined.

Before passing to a study of the relation of these organisms to the structure of the tumors in which they occur, it may be well to review the scanty literature on the presence of spirochetes in mouse and other carcinomata.

The first reference to the presence of spirochetes in malignant tumors is found in the report of Hoffman.[2] Under Hoffman's direction Mulzer found spirochetes in the scrapings from a case of carcinoma of the cervix and in two squamous epitheliomata, one from the face and the other from the abdominal aspect. All of these tumors were *advanced and ulcerated.* In all three cases the spirochetes showed coarse gyrations and stained more deeply than *Sp. pallida.* Certain individuals were encountered, however, which did not stain so deeply, and in the size and number of their gyrations closely approximated the latter organism.

Löwenthal[3] also describes the detection of spirochetes by the Giemsa method on the surface of ulcerated tumors. He calls attention to the fact that they are not only present in human tumors under such conditions, but that he has found them in numbers associated with the usual bacteria on the ulcerated surface of a tumor in the neck of a dog. He calls attention to the similarity of the organism he observed to a small spirochete found in feces.

This organism usually stains a pale blue with Giemsa, and stains also with a borax-methylene blue solution which does not stain *Sp. pallida.* The organisms are from 2.5 to 6 μ in length. He could not determine their thickness, but estimated it to be from 0.25 to 0.5 μ. They appear plumper when stained with Löffler's flagella stain. The gyrations are very close together and abrupt. The organism has usually from 4 to 12 corkscrews, and he estimates these to be about 0.5 μ apart. He proposes as the name for this organism "*Spirochaeta microgyrata.*" Up to the present he has been unable to determine the presence of flagella, and an undulating membrane was not visible, but he inferred from the increased plumpness of the organism, when stained with Löffler's flagella stain, that one was probably present. The long examples of the organism were frequently found to consist of two individuals attached at the ends. He considers that it may be readily differentiated from *Sp. pallida.* Besides this organism he frequently found a larger form from 5 to 11 μ in length with corkscrews from 1.5 to 2 μ apart which stains blue with

[2] *Berl. klin. Wchnschr.*, 1905, 42, p. 880. [3] *Ibid.*, 1906, 43, p. 283.

mma. In all cases where Löwenthal detected the spirochetes on the ulcerated surface of tumors he found regularly rodlike, straight or slightly bent, usage-like structures which in their appearance and form closely resembled the so-called fusiform bacillus which accompanies the spirochetes, known *Spirillum sputigenum*, so frequently found in the buccal cavity. Several thors have already advanced the view that there is a genetic relation between these fusiform structures and the spirochetes with which they are sociated. Löwenthal advocates the same view in connection with the fusirm structures accompanying the small spirochetes found on the surface of cerating tumors, for the reason that they invariably accompany these organms. He states that wherever he found fusiform structures in a smear, on urther search he never failed to find the small spirochetes in question.

Borrell[1] found helminthia in two inclosed mouse tumors surrounded by large umbers of leucocytes and endothelial phagocytes. The worms were transorted to the tumors through the blood vessels after penetrating the intestinal wall. In the neighborhood of these worms Borrel states that large numbers of spirochetes were present, and in a very cachectic mouse sent from Ehrlich's laboratory, in which the tumor was not ulcerated, he found large numbers of spirochetes. These had coarse gyrations. In the two cases described in Paris the spirochetes were of different form, very small, and with closely packed spirals. The tumors thus examined were movable beneath the skin, were not ulcerated, and at the time of publication were still living. He concluded that it was impossible to draw etiological conclusions from these observations, but he found it of great interest that spirochetes and worms were found in these particular strains.

Spirochetes in unulcerated human cancer, demonstrated by the silver method, have as yet been reported by but one observer, Friedenthal.[2] Friedenthal is of the opinion that the structures, which are clearly spirochetes from his illustrations are not organisms, but represent condensations of the protoplasm impregnated with silver. He obviously published his observations to show that so-called spirochetes of syphilis which Schultze and others hold to be nerve fibres and elastic fibres impregnated by the silver method, are not necessarily all attributable to the misinterpretation. Inasmuch as the structures he described were within the epithelial cells of the tumor, Friedenthal held that some of them were condensations of the protoplasm, etc., and not nerve endings or elastic fibres.

It will be seen that of these observers Mulzer describes a coarse spirochete on the ulcerated surface of human tumors; Löwenthal describes a coarse and a smaller organism, known as *Sp. microgyrata*, on the surface of ulcerated human tumor and in a tumor in the neck of a dog. None of these authors attributes any significance to the presence of these organisms, as they were found under conditions which could not justify any suggestion that they were other than accidental in their occurrence. Borrel found in two cases a small spirochete in connection with helminthia and an organism with coarse gyrations in a cachectic mouse tumor sent from Ehrlich's laboratory. Borrel does not state whether these tumors were primary or transplanted tumors, but the inference is that they were transplanted. He believed that the organ-

[1] *Comp. rend. de la Soc. de Biol.*, 1905, 58, p. 770.
[2] *Berl. klin. Wchnschr.*, 1906, 43, p. 283.

isms were conveyed to the tumors by the helminthia in the first two cases, and drew no conclusions as to their possible etiological significance in any of the three cases described.

Besides spirochetes associated with mouse tumors, Wenyon[1] describes a spirochete which he found in the blood of a gray mouse in the Pasteur Institute. From this mouse he succeeded in infecting other mice; in these both the blood and the spleen contained the organism and could be used for further inoculation. He inoculated as many as fifty mice and never encountered a case of natural immunity. The organisms stained readily with any of the ordinary stains — Giemsa, fuchsin, methylene blue, etc.

"In stained preparations the spirochete is seen as a uniformly staining spiral; the longer forms, however, show a clear unstained central spot (see Diagrams Nos. 8 and 9). The ends are slightly tapering; there is no sign of a nucleus or undulating membrane. As just mentioned, the larger forms have a clear spot at their center, and in some of these the body of the spiral tapers toward this spot. In some cases two small spirals are attached end to end by an unstained region. These forms are evidently stages of transverse division. No indications of longitudinal division were seen nor any mode of reproduction other than the one just mentioned.

"The number of the turns of the spiral varies from six in the longest forms to two in the shortest. The lengths of the spirochetes vary from 6 or 7 μ to 3 or 4 μ. The width is about 2 μ.

"The spirochete was always seen in the spiral form; no other forms were found at any time."

Wenyon states that, after discussing the matter with M. Borrel, they arrived at the conclusion that the organism just described and the one observed by Borrel[2] in the juice of malignant growths of mice are the same organism; comparison of Borrel's preparations and those of Wenyon lead to the same conclusion. Wenyon attempted to test the theory of Borrel that these organisms had migrated into the tumors from the intestinal tract, by inoculating mice with mucus from the intestinal tract of mice which contained large numbers of varying kinds of spirochetes. These conclusions were negative; no infection or abscess resulted. The mucus from the intestinal tract of a mouse infected with *Spirochaeta m.* likewise gave negative results. Wenyon concluded that there is no evidence that these spirochetes have originated in the intestine.

The description given by Wenyon of the organism found in the blood of otherwise normal mice clearly distinguishes it from the organism which we have described. If it be identical with the organism found by Borrel in his mouse tumors that would seem to distinguish this organism from the organism which we have found. Borrel does not give the method by which he succeeded in demonstrating the organism found in his mouse tumors, but as his publication antedates that of Levaditi, it is highly probable that it was by means of the Giemsa or some aniline staining method. Whether our inability to stain our organism with any of the aniline methods will prove a means of distinguishing it from other small organisms, such as that of Löwenthal and the smaller organisms found by Borrel in combination with helmin-

[1] *Jour. Hyg.*, 1906, 6, p. 580.

[2] *Compt. rend. de la Soc. de Biol.*, 1905, 58, p. 770

hia, remains to be seen, but the forms with the coarser gyrations appear to e clearly distinguishable from our organism.

The distribution of the organisms through the primary tumors examined is of great importance. A careful study of these tumors will appear to throw some light on whether or not the organisms were accidental in their relation to the tumors in which they are found, or whether they may bear some etiological relation. A description of one of these tumors will suffice for all, the only difference being in the number of organisms which the small fragments impregnated with silver happen to contain. The greatest number were found in the primary tumor known as G-7, and, with the qualification that the other tumors contain fewer organisms, the description of this tumor will apply to the remaining eight.

This tumor was sent from Massachusetts and remained in the laboratory about two days. The tumor was about the size of a small bean, measuring approximately 1 cm. by 0.6 cm. in its greatest diameter. It was slightly flattened, freely movable beneath the skin, and was situated on the ventral aspect. The mouse was killed and the tumor removed September 20, 1906. Weight of mouse 33.5 grams, weight of tumor 1.5 grams. Six mice, Lot 031, were inoculated with portions of the tumor. Results to date negative. Small fragments of the tumor were hardened in formalin, and some of them impregnated by the Levaditi method.

An examination of a section of the tumor hardened in formalin and stained with Borrel's method, with low power, shows the tumor to be a rapidly growing adenocarcinoma of the breast. In many portions the tumor assumes the characteristics of a rapidly growing carcinoma solidum. At the edge of the tumor is the usual characteristic proliferation of the connective tissue invaded by prolongations and nests of epithelium from the tumor mass. In some portions of the periphery a more or less definite connective tissue capsule is present. Scattered through the tumor are the small areas of necrosis which characterize rapidly growing tumors of this type. The stroma is in some portions of the tumor poorly developed, in others well defined. Here and there, especially at the margins where the tumor is penetrating into the connective tissue structure, the tendency to the adenomatous type is quite marked. In these regions cysts of considerable size can be found, filled with the usual coagulated fluid mixed with cell detritus. A careful examination of such a section with oil immersion fails to show the presence of any organisms, even after comparison with sections from the immediate neighborhood impregnated with the Levaditi method in which plentiful spirochetes are present. Not even unstained structures which one might identify can be determined.

Sections from small pieces of the tumor impregnated by the Levaditi method, examined under high power, present a very striking appearance. First of all, lying free within the cysts in the coagulated contents, are found sharply defined, intensely black spirals, measuring from 2.5 to 7.8 μ in length. The corkscrews are from three or four to 13 or even more in number. These organisms are more or less regularly distributed through the cyst spaces (see Fig. 4, Plate 3), and present so characteristic an appearance that they can, to our minds, never be confused with nerve endings. In the rapidly growing portions of the tumor between the epithelial cells one frequently encounters aggregations of five or six, or even a dozen, of these characteristic organisms lying in small, clear spaces between the epithelial cells, as though they were surrounded by some clear fluid producing a form of vacuole (Fig. 6, Plate 3).

Passing to the margins of the tumor, one finds that in the nests of epithelium penetrating into the connective tissue stroma the lumena of the small tubular structures frequently contain aggregations of organisms, and here and there free epithelial cells with organisms in their protoplasm. One can easily imagine that the development of the larger cysts in the tumor might be determined by the proliferation of the epithelium around the small groups of organisms thus found. Beginning with a secretion of fluid around the organisms, as shown in Fig. 6, Plate 3, the proliferation of the epithelium might produce the beginning of a cyst, such as is represented by Figs. 8 and 3; and the continued secretion of fluid and associated proliferation might ultimately terminate in the development of a larger cyst, such as Fig. 4. The invariable presence of organisms in the larger cyst cavities would suggest such a possibility. The organisms are distributed in this tumor in such a way that the largest numbers of organisms are in the most rapidly growing portions of the periphery. Occasional organisms are found in the connective tissue beyond the growing edge of the tumor. This is especially well seen where the epithelium is penetrating into the adjacent fat tissue. Here organisms will be found betwen the fat cells a short distance in advance of the epithelium, but when one investigates the surrounding normal tissues beyond this zone, no organisms are to be found. Where the stroma of the tumor is best developed one frequently finds organisms in the stroma. Where this is not so well defined, they lie betwen the epithelial cells, as shown in Figs. 3, 6, and 8, Plate 3. Occasionally organisms can be found within the epithelial cells. Here they are frequently curved into ring forms (Fig. 7, Plate 3), or in aggregations suggesting agglutination (Fig. 7, Plate 3). The characteristic spiral form of the organism is not always apparent. Occasional forms will be met where the silver appears to have impregnated the organisms homogeneously. This is usually the case with organisms within the protoplasm of epithelial cells (Figs. 7 and 8, Plate 3), and in these cases the organism frequently presents a beaded appearance suggestive of involution forms or degeneration approaching disintegration. In regions where phagocytosis is active one will find fragments of the organisms in the protoplasm of the epithelium, the organisms in these cases appearing to break up into minute granules or short S-shaped structures similar to the changes in *Sp. Obermeieri* in mononuclear macrophages in the peritoneal cavities of hyperimmunized rats (Pfeiffer's phenomenon).

The examination of sections of the remaining eight carcinomata the breast in mice differ in no way from the findings in G-7. the tumors in which there are few organisms these are found lusively at the very margin of the growing edge, in the center cell nests, and in the connective tissue stroma surrounding the nor.

In the transplanted tumors the distribution is even more pro- uncedly at the margin of the tumors. In rapidly growing, dy transplants, the organisms are massed in the zone of con- ctive tissue proliferation at the margin, and in the more viru- it tumors, such as the Brooklyn tumor, the organisms are fre- ently present in great numbers (Fig. 5, Plate 1). Involution ms and disintegrating organisms are very frequent in these as. Phagocytosis does not seem to be so active in these tumors. reful examination of the sections from the Springfield, Jensen, l Brooklyn strains shows no differences in appearance or meas- ments, distribution, or characteristics of the organisms in the ferent strains. We appear here to be dealing with a definite anism. In large, late transplanted tumors, in which there areas of extensive necrosis, the organisms are exclusively con- ed to the growing margins of the tumor. When, as occasionally pens, the necrosis extends to the periphery of the tumor, the acent connective tissue zone contains either no organisms or asionally disintegrating or involution forms. In two large nors examined, which were badly contaminated with bacteria, spirochetes whatever could be found.

With the determination of the practically constant association this characteristic organism in primary and transplanted use tumors naturally arises the question as to their sig- icance. Although it will require a prolonged and careful rch through other types of tumors, especially in other animals l in human beings, before the relation of this organism to tumors in question can be definitely ascertained, still it ld seem not improper to discuss in the light of the striking dence of cage infection in this very group of tumors, the sible etiological significance of these organisms. Up to the sent time those who have sought for parasites in cancer have rched for an intracellular organism, and at first glance it would

seem difficult to understand how an organism with the distribution of the one in question could be responsible for the epithelial proliferation necessary for the production of a malignant growth. We have for some time assumed that extracellular organisms might be the cause of the proliferation of epithelium through the medium of some toxic substance which they elaborate. Evidence of the existence of some bio-chemical substance of this sort in tumors has come to us in the course of our experimentation. The interesting work of Clowes and Baeslack from this laboratory on "The Influence Exerted on the Virulence of Carcinoma in Mice by Subjecting the Tumor Material to Incubation Previous to Inoculation," is a case in point, Clowes having reasoned that the best explanation of the marked increase in virulence produced by a short period of incubation resulted from the effect of increased temperature upon the rate of reaction of some stimulating substance contained in the tumors. These interesting observations have had a very positive and new light shed upon them by the work of Bernhard Fischer.[1] Fischer has made the discovery that there are certain chemical substances (thus far the fat stains, scarlet R, Sudan III, and indophenol) which possess a positive chemotactic quality for the epithelium of the skin in rabbits, and possibly some other animals. This chemotactic or attractive quality is exerted only when these fat stains, dissolved in olive oil, are injected into the subcutaneous tissue beneath the skin. Here they set up a chronic connective tissue proliferation similar to that found about the margins of beginning epitheliomata of the skin. The scarlet R oil penetrates into all the lymph spaces and crevices of the tissue and, with the advent of the chronic connective tissue proliferation, exerts a chemotactic attraction for the epithelium of the deeper layers of the adjacent skin. Oil alone does not exert an activity to this extent, and it is Fischer's opinion that part of the scarlet R, although but slightly soluble in water, is taken up by the lymph and transplanted to the epithelium which it stimulates to proliferation. Within a short period (three weeks) the presence of the scarlet R in the subcutaneous tissue produces an active proliferation of the epithelium of the skin, of the hair follicles and

[1] Münch med. Wchnschr., 1906, 53, p. 2041.

sebaceous glands, associated with the presence of typical and atypical karyokinetic figures. The epithelium penetrates into the surrounding connective tissue in the form of characteristic prolongations and nests, such as charactertize the beginning of squamous epithelioma of the skin. Typical epithelial pearls are formed, and Fischer states that at this stage of the process the histological appearance is indistinguishable from epithelioma of the skin. The illustrations which he gives confirm this opinion. That it is the scarlet R which attracts the epithelium is shown by the epithelium growing down to, surrounding, and gradually removing the saturated oil drops. Where the scarlet oil penetrates into the lymph spaces the epithelium proliferates in the lymph spaces in pursuit of it, and in one case, where Fischer wounded the cartilage with the needle used for injection, he found the epithelium penetrating into the lymph spaces of the cartilage and the clefts which contained the scarlet oil. That part of the coloring matter is diffused through the tissues; and that it is in this way that scarlet R produces its first effect upon the more or less distant epithelium is shown by the occasional extensive staining of the fat constituents of the adjacent cartilage cells where the scarlet R has been injected into the connective tissue in the immediate neighborhood. Fischer found that scarlet R affects only the epithelium of the epidermis of the rabbit. Attempts to produce similar proliferations by injecting the stain into the breast, under the epithelium of the stomach and intestinal tract, have proven invariably negative. In one case of a dog in which a large amount of scarlet R was injected beneath the skin producing the characteristic proliferation of the epithelium, small nodules apparently derived from proliferation of the alveolar epithelium of the lung were found, and Fischer suggests that possibly this type of epithelium may prove less specific than others and also react to the stimulus of scarlet R.

From his experiments it would appear that scarlet R is capable of affecting only one kind of epithelium, the epidermis. Upon the cells of this structure it exerts, from its position in the subcutaneous tissue, an attractive or chemotactic function which causes the epithelium to proliferate in the deeper structures, producing in the height of its activity, a picture indistinguishable from be-

ginning carcinoma. Here, however, the analogy ceases; for when the scarlet R is entirely absorbed by the epithelium, the cells rapidly hornify, and the entire process subsides. Fischer points out that all that is needed to extend this process into carcinoma would be the local, continuous production of some chemical substance similar in its affinities and characteristics to scarlet R. In a footnote he states that he appreciates that the advocates of the parasitic theory can utilize his observations in support of some parasite working through the medium of an *attraxine,* as he calls thus substance; in which case it would be necessary, however, to assume a special organism for every type of epithelium subject to cancerous transformation.

The distribution of the organism which we have described corresponds in a very striking degree to the distribution of the scarlet R in Fischer's experiments. The absorption and removal of the scarlet oil by the epithelium finds its counterpart in the evidence of phagocytosis which we have noted. If the spiral organisms found in our tumors are the cause of these tumors, then they produce the proliferation of the epithelium through the medium of some toxic substance which they elaborate. That such a toxic substance possibly exists has, as we have pointed out, already been shown by Clowes. To our minds, the necessity of assuming a different organism for each type of epithelium rather simplifies than complicates the problem, and it is not impossible that organisms belonging in the same class, or of widely different characteristics, may possess the power of elaborating specific toxic substances. A striking possibility in this connection is the so-called Bilharzia disease, in which typical cancer of the bladder is associated with the presence of the embryos of the worm in the bladder wall. It is also of interest that in Bilharzia disease no metastases have ever been found, although the local disease of the bladder presents the characteristics of infiltrating carcinoma.

The evidence of immunity associated with these tumors is, to our minds, likewise suggestive of a possible etiological significance of these organisms, and, in this connection, the conditions found in the tumor 31[10] referred to at the beginning of this article are of great interest. This tumor at the time of its removal and hardening had begun to retrograde and presented the

stological characteristics of spontaneously retrograding tumors. is possible that this tumor was hardened at the moment when very active phagocytosis on the part of the remaining epithe-ım was in progress. As shown in Fig. 1, Plate 3 of this art-le, and in Figs. 5 and 6, Plate 17 of Calkins and Clowes's ticle in this journal, many of the epithelial cells of this tumor ntained large numbers of small, rodlike structures, which, in e writer's opinion, are the organisms we have described, in-usted with mercury. If one studies the vacuoles containing ese structures in sections of this tumor, one can trace through e smaller vacuoles a gradual disintegration and final disappear-ıce of these structures within the vacuoles. The whole presents picture which strongly suggests the description given by Novy ıd Knapp[1] of the disintegration of *Sp. Obermeieri* in the bodies phagocytes after the injection of blood containing large num-rs of this organism into the peritoneal cavity of recovered rats. s the entire process in the case of *Sp. Obermeieri* occurred in period of less than ten minutes, it would appear that, if the pearance found in this tumor illustrated such a phenomenon the mouse tumors, the tumor was placed in the hardening ent at the psychological moment. It will, however, require rther experimentation to confirm the significance of these ap-arances.

It is obviously too early to draw far-reaching conclusions from e presence of this organism in our mouse tumors. First, of , more extensive experiments must be carried out. These are progress, and the organism is being studied in all its relations the tumor in question, in which investigations Drs. Calkins d Clowes have joined. The description of what appear to be ıilar organisms impregnated with silver in a case of uncon-ninated human cancer of the breast by Friedenthal naturally ggests that a further search for these organisms in human nors may lead to positive results in this connection, and such a tematic search has already been inaugurated. At present it pears to us that the constancy with which this organism is ınd in the primary and transplanted mouse tumors is very iking; that in the light of Fischer's work it would appear to

[1] *Jour. Infect. Dis.*, 1906, 3, p. 291.

us quite possible that an extracellular organism distributed as this organism is distributed, could be the cause of the proliferation; that the evidence of phagocytosis and the detection of these organisms at times within the protoplasm of epithelial cells would sufficiently explain the establishment of metastases by the transportation of infected cells. The organism should be found with continued regularity, in which case it would appear to bear the same relation to these tumors as does *Sp. pallida* to syphilis.

SUMMARY

1. In 1905 there were found in vacuoles in the epithelial cells of a retrograding mouse tumor, fine, rodlike structures impregnated with mercury. These the writer held to be parasites.

2. Attempts to fix these structures were not successful until the advent of Levaditi's method. With this method a characteristic spiral organism 2.5 to 7.8 μ in length and 0.6 μ in width, with four to thirteen turns per individual, has been demonstrated in ten consecutive spontaneous carcinomata of the breast in mice obtained from Massahcusetts, Ohio, and New York. In one other tumor the hardening method was a failure.

3. An examination of sixteen transplanted mouse tumors from three different sources shows the presence of the same organism in all tumors examined.

4. An examination of fresh materials from all transplanted uncontaminated tumors from these strains demonstrates the organism in the living state. It is frequently motile and is found with difficulty.

5. Measurements made on the fresh organism correspond closely with the measurements made in the stained preparations.

6. The distribution of the organism through the primary tumors shows that they are most prevalent in the most actively growing portions of the tumor; that they live in the connective tissue at the margin of the tumors, and in the stroma of the tumor; that they are found between the epithelial cells of the tumor and in the cyst cavities of the tumors where these are present.

7. In the early transplanted tumors the organisms are found in the connective tissue zone at the growing edge and between the cells at the growing edge.

8. The more virulent tumors contain the greatest number of organisms.

9. In both primary and transplanted mouse tumors evidences of phagocytosis on the part of the epithelial cells are to be found. The organism in these cells frequently assumes the form of rings and breaks down into small S-shaped segments and granules.

10. In two tumors badly contaminated by bacteria no spirochetes could be found.

11. The examination of organs and subcutaneous tissues of five normal mice by the Levaditi method has shown no spirochetes.

12. All attempts to stain the organism with aniline stains to date have proven unsuccessful.

13. The organism is morphologically distinguished from the organism described by Wenyon in the blood of mice.

14. It would appear to be distinguishable from the *Spirochaeta microgyrata* of Löwenthal and the organisms found by Borrel in mouse tumors, both of which are stained with the Giemsa stain, by its inability to take this stain.

15. Our observations do not as yet establish an etiological relation between this organism and cancer of the breast in mice, but the presence of the organism in primary mouse cancers with which it is regularly transplanted through many generations, greatly increasing in number as the tumors increase in virulence, instead of interfering with, and finally preventing, transplantation as do bacteria, is suggestive.

DESCRIPTION OF PLATE 1

FIG. 1.— Epithelial cell with large vacuole in protoplasm. Nucleus pushed to one side. Vacuole filled with fine rodlike bodies some of which show gyrations and beadlike structure. Taken from Jensen mouse tumor 1905. Sublimate fixation. Organism unstained. ×1,030.

FIG. 2.— Spirochetes from margin of transplanted Springfield tumor. Carcinoma solidum of the breast. Levaditi silver method. ×1,360.

FIG. 3.— Spirochetes between the epithelial cells of primary adenocarcinoma of the breast in mouse G-7. ×1,030.

FIG. 4.— Section through cyst in carcinoma of the breast, mouse G-7, showing three spirochetes in cyst contents. ×1,030.

FIG. 5.— Large numbers of spirochetes in margin of rapidly growing transplanted carcinoma of the breast, Brooklyn tumor. ×1,030.

FIG. 6.— Group of organisms between the epithelial cells of primary carcinoma, mouse G-7. ×1,030.

FIG. 7.— Spirochetes in protoplasm of epithelial cell, same tumor as Figs. 3, 4, and 6, showing phagocytic action of epithelium. Spirochetes in form of a ring and agglutinated organisms. ×1,030.

FIG. 8— Spirochetes in protoplasm of epithelial cell at the center of nest of growing epithelium. ×1,030.

In Figs. 1, 3, 4. 5, 7, and 8 the spirals are not easily seen, owing to the low magnification which was chosen to show the relation of the organisms to the tissue. In Figs. 2 and 6 the spirals are perfectly distinct. In every case, however, except in Figs. 7 and 8 the spirals are plainly discernible through the microscope. In Figs. 7 and 8, representing degeneration forms, the spirals are not intact.



FIG. 1.



FIG. 2.



FIG. 3.



FIG. 4.

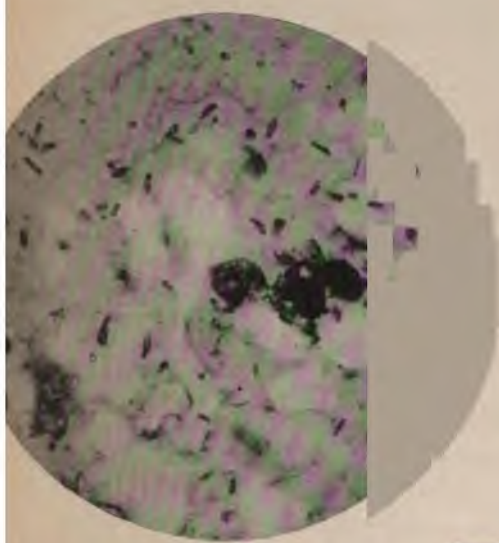


FIG. 5.



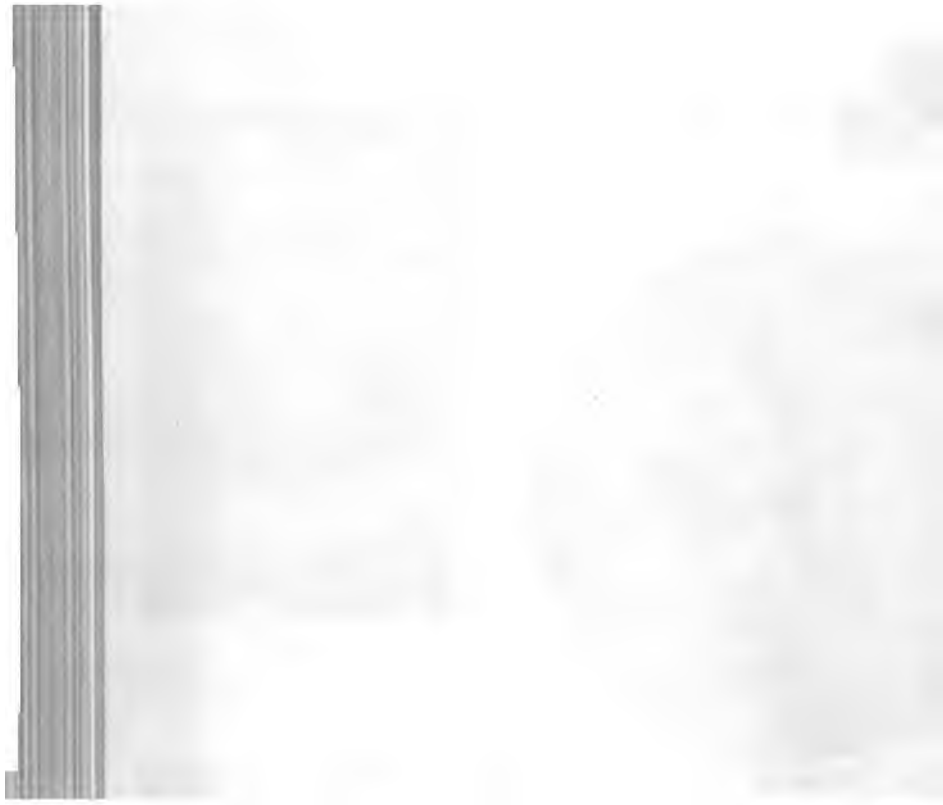
IG. 6.



FIG. 7.



FIG. 8.



A SPIROCHETE IN MOUSE CANCER, SPIROCHAETA MICROGYRATA (LOWENTHAL) VAR. GAYLORDI *

BY GARY N. CALKINS

WITH the uncertainty at the present time which attaches to species of *Spirochaeta,* it does not seem wise to make a new one for this parasite of the mouse tumors. Both in the case of *Trypanosoma* and of *Spirochaeta* new species have been created on the basis of purely physiological grounds, and many of the supposed "good" species of both of these genera will probably turn out to be mere variants of one or another. The mere fact than an organism will not live in the blood which serves as a culture medium for another organism of apparently identical structure and character is not enough to satisfy the requirements of a new species. There are many species of protozoa which are represented by salt-and fresh-water forms, and although the fresh-water forms cannot live if placed in salt water, nor salt-water forms in fresh water, no one would think of making different species of these organisms because of their mode of life. So it is with these spirochetes and similar flagellates; a physiological difference, while important in matters of therapeutics, has little value in taxonomy, and the creation of new species therefore, may well be left until the life-history of different forms is made out.

Thus it is with the spirochete in mouse cancer which Gaylord discovered last summer. In dimensions and in general character the organism agrees perfectly with the one which Löwenthal described in 1906 in ulcerated human carcinoma, in a dog tumor, and in feces; but his spirochete stained readily with the Giemsa stain, and the present one stains with the greatest difficulty. It will be remembered that this difference was the sole distinction between *Sp. refringens* and *Sp. pallida* at the time of their discovery, although subsequent observations have shown that the one has an undulating membrane and no flagella, while the other has flagella and no membrane. In view of this difference in staining capacity and in the host of the organism on the one side, and

* Received for publication, March 11, 1907.

for convenience in reference in future work on the other, I venture to give to this parasite in mouse cancer a new variety name, with the understanding that should future research show it to be a distinct species, the variety name shall become the specific name. Löwenthal's species name *Spirochaeta microgyrata* is sufficiently distinctive to characterize the organism, and to this I would add the variety name *Gaylordi,* in recognition of the fact that Dr. Gaylord was the first to study the relation of this organism to these tumors.

With the exception of Löwenthal's original description,[1] there has apparently been no subsequent recognition of this species. We may have seen it in 1905 as the basis of the curious artefacts which appeared in one of the mouse tumors at the Buffalo laboratory, but it was certainly not recognized at that time as a spirochete. Borrel[2] may have seen it in 1905 in the three mouse tumors in which two forms of spirochete were observed, but no measurements and no figures were given, and no importance was attached to the presence of the organisms. Wenyon[3] evidently did not see it in his *Spirochaeta muris,* for the dimensions which he gives belong to an altogether different organism.

There is considerable question as to what constitutes the "unit" organism in *Spirochaeta,* and the majority of specific characterizations in consequence are vague and misleading. Most observers give the number of "turns," or, as I shall call them, "nodes" (a node representing the part from the crest of one undulation to the crest of the next adjacent), and the total length, both of them varying within rather wide limits. Such wide variations, especially when the organisms are supposed by many to divide by longitudinal division, are incompatible with what we know of unicellular forms generally, and the a priori conclusion is that these diverse sizes are the result of end-to-end union of smaller units forming variable aggregates which recall other catenoid colonies among the protozoa. Löwenthal, Krzysztalowicz and Siedlecki, Schültz, and others describe the breaking-up of spirals of *Sp. pallida* into smaller elements which are variously interpreted, while Novy describes the fragmenta-

[1] *Berl. klin. Wchnschr.*, 1906, 43, p. 283.
[2] *Compt. rend. de la Soc. de Biol.*, 1905, 58, p. 770.
[3] *Jour. Hyg.*, 1906, 6, p. 580.

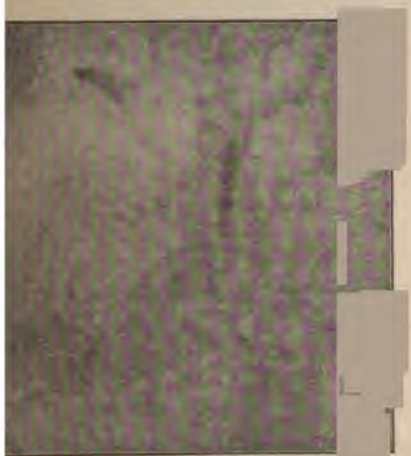
of *Sp. Obermeieri* under the action of phagocytes. These
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node or by ascertaining
total length of the or-
sm and the number of
s, and thus getting the
age size of the node.
it ordinarily appears,



FIG. 2.— A group of spirochetes (two in focus) from a primary tumor from the zoological laboratory, Columbia University. ×2,500.

organism measures from 2.5 μ. to 7.8 μ. in length, and it is made up of from 4 to 13 nodes. The average length of the node in a great many measurements is 0.6 u, and the organism is 0.6 u wide. The nodes therefore are characteristically crowded and the undulations steep. Compared with *Sp. Obermeieri, Sp. refringens,* and *Sp. pallida,* this form is much shorter, has more crowded nodes and a greater diameter both relatively and absolutely (Fig. 1).



. 1.—*Spirochetes microgyrata* Löw., *Gaylordi.* A single specimen from a planted tumor of the Jensen series. 0.

The ends of *Spirochaeta microgyrata Gaylordi* are

blunt and rounded and there is no evidence of tapering at the extremities, nor of undulating membrane, nor of flagella. (The apparent flagellum seen in Fig. 1 is an illusion caused by a slight fold in the membrane of the host sell in which the spirochete lies.)

In this preliminary communication it will not be possible to describe all of the changes which the spirochete undergoes in the cancer cells. Some of the changes that have been observed are undoubtedly phases in development of the organism as ordinarily seen, while others are undoubtedly involution forms. These different conditions are best seen in primary tumors, several of which have been obtained at the Buffalo laboratory and one at Columbia University in a mouse that had not been near the Buffalo laboratory, nor had it been near mice or cages from that place. I state this in some detail because of the possible criticism that spirochetes of this same type are found in all the tumors at the Buffalo laboratory because of a widespread infection there. Fig. 2 is a photograph of spirochetes from the primary tumor that developed in the Columbia laboratory, and Fig. 3 is a photograph from the same tumor showing a reduced condition of the spirochetes, perhaps due to the phagocytic action of the cancer cells.



FIG. 3.— Two individuals undergoing degeneration. From the Columbia tumor. ×2,500.

Various enigmatical structures are found in the nuclei of the epithelial cells of these primary cancers — structures which I have failed to find in any of the normal glandular tissue which has been treated in the same way as the cancer tissue (i. e., by the Levaditi silver impregnation method). For this comparison

I have examined carefully tissue from thyroid, liver, intestine, and, in addition, mesentery connective tissue and muscles, all from normal mice, and in no case have I found the organism or intranuclear bodies mentioned above. In a future publication I hope to be able to throw some light on the significance of these intranuclear structures.

ABSTRACT OF THE WORK DONE IN THE NEW YORK STATE CANCER LABORATORY DURING 1907*

Dr H. R. Gaylord reported from the New York State Cancer Laboratory further observations on a breeding establishment in Massachusetts where cancer in mice is endemic. This is the same establishment which was reported at a meeting of the British Medical Association in Toronto in August, 1906. At the present time the laboratory has records covering eighteen months, during which time it has received fifty-one tumors in mice and knows of twelve other tumors in mice supplied to other scientists during this period, sixty-three tumors in mice developing in mice during the period of eighteen months. In this time this breeder has reared approximately 7,000 mice. These fifty-one tumors, with the exception of one, have occurred in female mice. Forty-nine of them are tumors originating in the breast in females, one a squamous-celled epithelioma of the vulva in a female and one a fibro-sarcoma surrounding the right humerus. The breast tumors were distributed over the abdominal aspect and corresponding to the normal distribution of mammary tissue in the mouse. They presented everything from a simple adenoma to carcinoma solidum. In practically every tumor transition from simple adenoma to adenocarcinoma and carcinoma solidum could be traced. Fifteen of these tumors were transplanted; three took in the first generation and died out in the second; one continued and is now in the sixth generation.

Within the last year this breeder has begun breeding white rats at our suggestion and in stock coming from her establishment we have found four rats with spontaneous tumors. All of these tumors have been fibro-adenomata of the breast, with the exception of one which is unquestionably an adenocarcinoma. During this period she has raised about 1,000 white rats.

The laboratory has had business relations with a breeder in Washington for the past three years, who sells about 2,500 white mice per annum and as many white rats. We have had a standing reward with him for mice or rats with tumors. He has never

*Reported at the first meeting of the Association for Cancer Research, November 15, 1907, by Dr. H. R. Gaylord.

been able to supply us with a single tumor from his own stock but as evidence that he thoroughly understands the significance of our reward, he has secured a tumor mouse for us from another dealer.

The laboratory possesses at present five transplantable mouse carcinomata and the spindle-celled sarcoma of the thyroid in a rat previously described as developing, with two other cases of fibrosarcoma, in a cage which had been used by Dr. Leo Loeb for sarcoma rats brought from Chicago. This sarcoma of the thyroid has now been transplanted through eight generations. The number of successful inoculations was surprisingly high in the first generation, giving five tumors in twenty-three inoculated rats, =21.8%. In the second generation but six tumors developed in 172 inoculated rats, being 3.5%; the third generation fourteen tumors in sixty-one rats =23%; fourth generation eight tumors in 125 rats =6.4%; fifth generation twenty-nine tumors in ninety rats =32.2%; sixth generation thirty-seven tumors in 260 rats =14.2%; seventh generation twelve tumors in 123 rats =9.8%; eighth generation ninety-nine rats have been inoculated, in which thus far but four tumors have developed.

Summary.—Total number of rats, 854; total number of tumors, 111; percentage of tumors, 13.

These tumors have frequently reached great size, even exceeding that of the rat. As will be observed from the figures, there is no notable increase in virulence, the relatively high percentages obtained in one generation frequently falling low in the next. This is probably owing to the lack of susceptibility in certain races of rats. The tumor appears to take just as well in parti-colored rats as in white rats. There have been occasional spontaneous recoveries and these rats have proved immune. The histological characteristics of the tumor have not changed; it presents the characteristics of spindle-celled sarcoma.

A careful examination has been made of the different strains of transplantable mouse tumors in the laboratory in search of sarcomatous changes in the stroma of transplanted mouse carcinomata, as first described by Ehrlich and Apolant and recently observed by Bashford. We have not thus far any evidence of such transformation in any of our transplanted strains.

A few months ago the laboratory came into possession of a female thoroughbred English bulldog suffering from round-celled sarcoma of the vagina of the type described by Smith and Washbourn, Sticker, Bashford, Ewing and Beebe. Through the kindness of Dr. Beebe, a spontaneously recovered and supposedly immune dog was sent to us from New York and Dr. Crile kindly came to Buffalo and after deep bleeding transfused the blood of the immune dog into the dog with the primary round-celled sarcoma. During the first two weeks there was marked diminution in the size of the tumors, the mass which entirely filled the perineum decreased in both dimensions two centimeters and then remained stationary for a period, and in our opinion was beginning to grow, when a second partial transfusion of the blood of a normal dog was performed. This made no impression on the tumor. A third transfusion was undertaken, employing two immune dogs furnished by Dr. Beebe, but unfortunately the bulldog was lost through the anæsthetic. From this experiment it would appear that round-celled sarcoma acquired in the natural way by dogs, may be influenced by transfusion with the blood of dogs rendered experimentally immune by spontaneous recovery from an inoculation tumor.

We wish to call attention to an apparently new phenomenon observed in the State laboratory in the sarcoma rats. Dr. Flexner has stated that there is no difficulty in implanting a second tumor in an animal in which a first inoculation has been successful, as opposed to the observation of Ehrlich, later confirmed by Clowes, that in mice the establishment of a first inoculation tumor usually prevents the development of a second inoculation. In attempting to repeat this observation in our sarcoma rats, animals were reinoculated every six days, with the result that it has been found that some twenty-five rats out of forty thus inoculated have developed more than one tumor, which have persisted side by side for a period equal to that usually required to kill when the tumors were not inhibited, and then retrograded. The tumors made their appearance successively, some growing as large as small hazelnuts and then remaining stationary for a period of from twenty to thirty days, when the tumors entirely disappear in a period of from

seven to eight days. In only one case did a rat develop two tumors which grew until exitus. A number of these rats have been reinoculated, some of them a year later, and have proved to be immune. This phenomenon has occurred so often that it appears to be characteristic of the present state of virulence of this tumor and suggests that repeated successful inoculations may, under certain conditions, tend to bring about immunity, where one inoculation does not suffice. It is possible that the marked difference in this respect between our tumor and Dr. Flexner's in which multiple grafts regularly grew side by side to exitus, may be explained by the great virulence (90 to 100 per cent.) of his tumor, and the relatively low virulence (13 per cent.) of ours, but it appears that in many respects each tumor is a law unto itself, with the exception of certain basic phenomena which have now been found with sufficient regularity to establish their character as fundamental.

THE SO-CALLED RHYTHMS OF GROWTH-ENERGY IN MOUSE CANCER*

BY GARY N. CALKINS

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The cause of carcinoma — the subtlest of human diseases today — is essentially a biological problem, the attempted solution of which has drawn out many wild guesses, not a few misapplications of biological principles, and some good working hypotheses. Stated in its simplest form, the problem is to find out what causes the continued division of the epithelial cells of the tumor. Albrecht,[1] writing of tumors, quotes Berkeley to the effect "that we have raised a dust and then complain that we cannot see," and uses this as a text to undermine the various theories that have been constructed to explain cancer. But Albrecht by no means lays the dust with his criticisms, while his own hypothesis that a tumor is only a newly developing organ which appears later in life than the normal organs rather thickens the cloud by complicating the conceptions of normal development. We certainly get very little new light on the cause of cancer by giving to the tumor another name or by looking at the abnormal growth as a whole; attention must, rather, be focused upon the underlying biological phenomenon of the division energy of the individual cancer cell.

A half century ago Virchow pointed out the necessity of studying the single cell if we would get at the real interpretation of vital phenomena in health and disease, and biologists and pathologists alike at the present day recognize and act upon the truth of this belief. The single cell is the center of cancer growth; it is the source of metastasis or of transplanted tumor; it is capable of reproducing the disease, and, in short, by its reproduction and life history are brought about the biological manifestations which are interpreted as morbid symptoms of malignant growths.

* Received for publication January 28, 1908.

1 Albrecht, E., *Zeit. f. Path.*, 1907, i, 1.

Comparative physiology teaches that while all animals from man to protozoön perform the same vital functions which distinguish animals from plants on the one hand and non-living things on the other, the mechanism through which they are performed becomes more and more simple as we descend the scale. The complicated organs are replaced and the functions are equally well performed by simple organs or by mere tissues in the lower animals. With such simplification in structure the single cells, while individually no larger than the single cells of mammals, have a much more generalized work to perform. The few hundred cells of a hydra or jelly fish, or the twenty-nine to thirty cells of a dicyemid, without aggregation into organs, perform amongst them all the functions of digestion, assimilation, oxidation, secretion, excretion and reproduction, functions which are performed by different organs in higher animals. Such cells are generalized, and physiologically are much more perfectly balanced than are the cells of kidney, liver, heart or brain. Finally, amongst the protozoa, we find cells in which the physiological balance is perfect, for here, in the same protoplasm, are performed all of the vital functions which distinguish animate from inanimate things.

The comparison, then, of a single epithelial mammalian cell with a single free-living protozoön, shows a decided physiological superiority of the latter, since, capable of an independent existence, the protozoön is a much more perfect vital mechanism. The epithelial cell is specialized for the performance of a single function — not to the exclusion of other functions for of course it is living protoplasm, but this one function predominates over all others. Its existence is maintained, its needs supplied by the activity of other cells similarly specialized for some one function and it is dependent therefore upon these other cells. The measure of higher animal development is the degree of this differentiation and the complexity is manifested by the fact that these diversified and specialized cells are all coördinated for the good of the organism as a whole. The development of one group of cells is restrained and controlled by the regulating power of the whole, and development and differentiation find their highest expression in those organisms having the most specialized cells.

In every type of animal there is a more or less well defined

sation of growth when the definitive type is reached. This perfect type development is the goal to which every fertilized egg tends, and to reach it the egg, and the fertilized protozoön as well, are endowed with a certain potential of division energy. When the perfect organism is attained the individual cells cease to multiply and their activities are now directed towards the one physiological object for which they are specialized; division is resumed only when some external cause, such as a wound or other injury, starts up the inhibited development, while even this power of multiplication and regeneration is lost to some types of physiologically unbalanced tissue cells.

Of all cells of the higher animals the epithelial group retain the more perfectly balanced functions longer than those of any other cell type. Here for example belong the covering cells of the body, those of the Malpighian layer of the skin, retaining their division energy throughout the life of the organism, and here belong the germ cells with their potential of endless existence. But even in this group of the epithelial cells the potential of division energy varies, and in the highly specialized and physiologically unbalanced secreting cells it is early exhausted.

It is in the vital manifestations of these cells of the body that we must look for the cause of carcinoma. Here in the dividing cell is the seat of malignant growths, and here in the re-animation of the latent division energy is the real cause of from five to six deaths from cancer in every hundred deaths from all causes.

The carcinoma cell biologically is a perfect vital mechanism. It is no longer an epithelial cell; it has become changed from such a physiologically unbalanced unit, subject to the co-ordinating control and regulation of the organism, into a physiologically balanced cell, uncontrolled and unregulated.

Structurally the carcinoma cell differs from the functioning epithelial cell type; it is relatively larger; its nucleus is larger, both relatively and absolutely to the cell body, and a reticulated protoplasmic structure shows a marked change from the functional secreting cell. Functionally the carcinoma cell is a more perfect type than its orderly colleague of the epithelium. It takes in and assimilates abundance of food, grows rapidly, especially when near the immediate source of food, that is, at the growing edge,

and reproduces its kind through the same complicated processes of mitosis that characterize free living cells. In short, it is a complete animal organism in itself, simulating in many ways the parasitic protozoön, but differing in some of the most important respects connected with the continued life of the latter.

The long-continued transplantation of the Jensen tumor in mice, the fact that each new transplantation results in the formation of a mass of cancer cells derived from the transplanted cells, and this now through nearly one hundred generations of transplantations, indicates that the cancer cells are somehow endowed with the possibility of an indefinitely continued existence. It is, therefore, different from any animal organism that we know, either among the simply constructed protozoa, or among the more highly organized metazoa, for in all such cases, indefinitely continued protoplasmic existence is bound up with phenomena of fertilization and inheritance quite as subtle and as difficult to analyze as vitality itself. The cancer cell, so far as we know, undergoes no processes analogous to fertilization. The observations of Farmer, Moore and Walker[1] on heterotypical mitosis in cancer cells indicate only evidences of the degenerative changes which the majority of cancer cells must undergo, since it is impossible for all of the products of proliferation to find nutriment in the host organism, or to escape from its protective reactions. Cytologists, furthermore, are constantly demonstrating that heterotypical mitosis is only a condition which may be assumed by cells under abnormal treatment. Haecker,[2] for example, has shown that normal somatic division figures are transformed into heterotypical mitosis by treatment with ether and other poisons, and Miss Bonnevie[3] has recently shown that heterotypical mitoses are common enough in normally developing cells of various animals and plants. This type of mitosis, therefore, has nothing to do with the present problem as evidence at least of the cause of cancer. The further observations of Farmer, Moore and Walker as to a reduced number of chromosomes in cancer cells are better explained along the lines early

[1] Farmer, Moore and Walker, *Proc. Roy. Soc.*, 1903, lxxii, 499.
[2] Haecker, V., *Biol. Cent.*, 1904, xxiv, 787.
[3] Bonnevie, K., *Biol. Bull.*, 1907, xiii, 57.

pointed out by Hansemann, as due to abnormalities brought about by deranged mitotic figures in degenerating cells. So, too, the so-called "fertilization" of an epithelial cell by another epithelial cell, or by a leucocyte, maintained by the English observers, may be easily disproved by any one who takes the trouble to follow out the history of invading cells which are frequently found in cancer tissue. Such invaders disintegrate and ultimately break down into particles which, since the beginning of cancer research, have been variously interpreted as coccidia, as amœbæ, as "X"-bodies, or as "cancer cell inclusions" of one type or another.

Long continued observations on free living cells, such as the protozoa, have shown that periods of activity alternate with periods of depression of vitality in more or less regular rhythmic change. Diagrams I and Ia represent the life histories of two species of ciliated protozoa, *Paramecium aurelia* and *Oxytricha fallax*, the former as worked out by Calkins[1] the latter by Woodruff,[2] the variations in the curves indicating rhythmic variations in the vitality of the protoplasm under observation. The regularly recurring deep depressions in the Paramecium curve represent the periods of complete exhaustion of the division energy, an exhaustion overcome by the use of artificial stimulants. Such studies have proved the unquestionable variability of vitality in these free living forms. In certain embryonic cells, moreover, a more or less similar rhythm in development has been noted by a number of different observers. In this connection Wilson says: "* * * during the cleavage, the individual blastomers are often found to exhibit entirely different rhythms of division, periods of active division being succeeded by long pauses, and sometimes by an entire cessation of division even at a very early period."[3]

With their balanced physiological activities similar to those of a protozoön, we might expect alternating periods of depression and of greater activity in the protoplasm of cancer cells. Although the evidence is difficult to analyze because of the many factors

[1] Calkins, G. N., *Jour. of Exper. Zool.*, 1904, i. 423.
[2] Woodruff, L. L., *Jour. of Exper. Zool.*, 1905, ii. 585.
[3] Wilson, The Cell, 2d ed., p. 389.

involved in the relations of transplanted cells and new hosts, there is a certain amount of evidence to show that alternations of depression and vigor are characteristic of these cancer cells, but whether such alternations are due to variations in the division-energy or to something else remains to be proved.

The evidence for this alternation of depression and vigor in the cancer cell is constantly growing. Bashford, Murray and Bowen have plotted curves based upon the percentages of takes for ordinates and the length of time for tumors to grow to the inoculating point for abscissas. Such curves show alternations or waves of growth and the authors argue that they indicate rhythms of growth energy of the cancer cells.

Such an interpretation, however, cannot be readily granted. In the first place, the rhythms of growth, to be comparable with those of a free-living, or of a cleavage cell, should be looked for in the individual mouse and not in successive batches of mice. In the second place a curve such as Bashford, Murray and Bowen[1] present, introduces two distinct factors, one is the percentage of "takes" on transplantation which I will call the "infectivity" of the cancer cells, the other is the time factor in development of a tumor. It is this time factor which really measures the growth energy of the cells, the length of time required for a tumor to develop indicating roughly the rate of division of the cells. With the statistical evidence at hand these two factors may be compared and the comparison shows that something besides the growth energy is involved in what is usually regarded as the "malignity" of cancer cells. The accompanying diagram illustrates the point I wish to bring out.

In this diagram the one curve (continuous line) represents the variations in infectiveness of one of the Buffalo Laboratory tumors, known as the Brooklyn tumor; the other curve (broken line) indicates the number of days required for development to the point necessary to kill the inoculated mice. Each curve is based on averages of all mice involved in the successive transplantations, and the points obtained in each curve represent common transplantations, so that percentage of takes and length of time refer to the same cancer cells. For example in Period No.

[1] Bashford, Murray and Bowen, *Proc. Roy. Soc.*, 1906, B, lxxviii, 195.

4 the tumor cells upon inoculation in a large batch of mice gave tumors in 39 per cent. of the mice; a large number of these (17) died from the tumor, the average length of time required being sixty-six days. Here, then, is a means of measuring the relative growth energy of the cancer cells at different periods and a corresponding measure of the infectiveness of the same cells. The curve shows that the two factors are by no means equivalent and that too much is assumed in choosing the percentage of takes as the measure of growth energy. At the outset and in the early transplantations there is, it is true, a definite relation between the energy of growth and the infectivity: the number of days required falls steadily and the percentage of takes rises just as steadily, but after the tumor is fully established the relationship apparently disappears and the two curves behave differently, the infectivity remaining high on the average and quite independent of the growth energy as represented by the time factor. The waves of growth described by Bashford, Murray and Bowen are here shown by the regularly recurring alternations of infectivity, and not in the line showing growth energy.[9] It is the factor of infectivity, therefore, which Bashford, Murray and Bowen have interpreted as the factor of growth energy. It is this factor in transplanted cancer that runs in rhythms in successive batches and not the growth energy alone. The same phenomenon of contrast is shown in a curve (Plate XX) for our Brooklyn tumor similar to that which the English pathologists give for the Jensen tumor as observed in their laboratory. For this curve the percentages of "takes" are used for the ordinates and the number of days required for the tumor to grow to the inoculating point, for the abscissas. The several points on the curve marked with letters and numbers indicate the successive transplantations of the tumor cells. The relative time of development is shown by the length of the lines between the points, while the successive waves represent the rhythmic alternation of the infectivity. This curve has

[9] The minor fluctuations in the line showing growth-energy, although quite regular in this series, are so small as to fall within the limits of error. In similar curves for other tumors this regularity is not evident, while the characteristic rhythms shown in the curve of infectivity are similar to those here given.

the appearance of being stretched out at the ends and concentrated in the middle, a feature demonstrating the same phenomenon as the double curve in Diagram 2. It is based upon somewhat different statistics, the abscissas representing the number of days from inoculation to inoculation instead of from inoculation to death of the mice inoculated as in Diagram 2. The longer lines at the beginning and the end of the curve show comparatively long periods of growth, *i. e.*, relatively little growth energy, while in the center the shorter lines mark a more rapid growth. After the initial period of the first three or four inoculations the percentage of takes rises and remains high quite regardless of the variations in number of days required, *i. e.*, regardless of the growth energy. The same rhythms noted by Bashford, Murray and Bowen are evident here, sometimes concentrated, at other times drawn out according to the changing abscissas.

The tumor upon which this diagram is based was treated as all of our tumor material for transplantation is treated and a description of the process will give the basis of our belief in the specific division energy of the individual cancer cells. The original tumor cells, and all succeeding tumors, were ground up in a mortar with a given volume of salt solution. The connective tissue strands were removed by raking, and uniform doses of one half a cubic centimeter were introduced subcutaneously into each mouse of a series.

This method of transplantation means that the cancer cells are separated as far as possible from one another which gives a greater chance for individual cells to respond, or, on the other hand, to be acted upon by the protective factors of the host. Their response, that is, the tumor which develops, is perhaps, a better indication of the division energy of the cells than if a large piece of the cancer tissue is introduced. The rate of growth of similar amounts of such cancer cells inoculated at successive transplantations of the tumor, gives a reasonably accurate measure of the relative infectivity of the cancer cells at different periods, and this variable may be charted.

Transplantation (1) of the primary tumor was made May 30, 1905, the cancer mush being put into twenty-eight mice. None of these died inside of ten days, while five, or 18 per cent., de-

veloped tumors. One tumor suitable for transplantation developed in seventy-five days, while two of the cancer mice died. This tumor (2) was similarly teased and the cancer mush inoculated in the regular dosages, into thirty mice, of which three died inside of ten days and three, or 11 per cent., developed tumors. One of these tumors (3*a*) was ready for further inoculation in fifty-three days; a second (3*b*) and a third were ready in sixty-six days. These in turn were inoculated into different lots of mice of the fourth transplantation series, that lot inoculated with 3*a* giving 33 per cent. of takes, and that from 3*b* giving 25 per cent. The tumors from this second lot were used for further transplantations, the former for experiments and are therefore unsuitable for the present discussion. The mouse tumor designated 3*b*, giving 25 per cent. of takes upon reinoculation, developed four tumors which were ready for transplantation in thirty-nine, fifty-one, fifty-three and sixty-four days, and they were inoculated in different batches of mice of the fourth series.

With the three transplantations which had been made up to this point the cancer cells had been growing from 180 to 200 days, and in this time there is a noticeable shortening of the period of development from seventy-five days after the first transplantation to thirty-nine days in the case of 4*a*, and fifty-three days in 4*b*. The increasing percentage of takes, combined with the shortening of the time of development, indicates that the cancer cells were becoming accustomed to the soil, to use Bashford's expressive term of the different host mice, and were gaining strength with each new transplantation. That they were not yet perfectly adapted, however, is indicated by the fact that tumors which developed upon the fourth transplantation were not equally established, some dying out altogether within two subsequent transplantations, while others gave rise to highly virulent cancers. Thus 4*c* inoculated into a batch of mice produced only 18 per cent. of takes (5*b*), and these required forty-one days, while the same strain upon re-inoculation into the sixth series produced only 4 per cent., after which the strain died out entirely. Tumor 4*b* had a more remarkable history for some of its cells were apparently endowed with a very high,

and others with a very low, potential of vitality. This tumor, upon inoculation into the fifth series, produced only 15 per cent. of takes (5*f*), a marked decrease, but one of the tumors which developed in a short period of twenty-three days (5*f*), gave rise to a most malignant strain running up to 100 per cent. of takes in the twelfth transplantation (12*a*), while another tumor (5*c*) from the same source (4*b*) required sixty-four days and was comparatively feeble, for, upon re-inoculation into the sixth series, it gave only 4 per cent. of takes. It is seen, therefore, that at this early period of transplantation, the same tumor may give rise to a highly virulent strain, or to a weak strain, showing that the cancer cells are not fully adapted to new soils. Of course there are always two factors to take into consideration, one is the division energy of the cancer cells, the other, the natural resistance of the host into which such cells are inoculated. It is not improbable that the batch of mice into which 4*b* was transplanted had a relatively high protective reaction, so that the division energy of the cells as a whole was restrained, but the rapid growth of 5*f* shows that here was a mouse in which no such restraint was manifest, the natural resistance must have been weak or else the particular nutritive conditions must have been suitable, for the cancer cells acquired a high potential of activity. Tumor mouse 4*d* must have been similar to 5*f* in this respect, for the same cancer cells upon re-inoculation into the fifth series, now gave 80 per cent. of takes (5*d*, *e*), as against 15 per cent., and in periods ranging from thirty-four to forty-two days.

The further history of the Brooklyn tumor is the working out of these two lines of development, one from 4*d*, the other from 5*f*, and in both strains the characteristic rise and fall in rhythmic change is well shown in the curve. The high percentage of takes from 4*d* is continued in the next transplantation, 5*d* alone being used as the others were taken for experiments. This tumor, upon inoculation in the sixth series, gave 77 per cent. of takes in the short periods of twenty-five (6*b* and *c*) and forty-three (6*a*) days. After this, however, the infectivity declined for these tumors upon inoculation into the seventh series, yielded only 50 per cent. (7*b*) and 33 per cent. (7*a*) in thirty-three and thirty-six days, respec-

tively. The latter (*7a*) upon re-inoculation, however, shot up again to 80 per cent. in the eight series and in twenty-six days, thus marking a definite rhythm.

The history of tumor *5f* is more interesting and is marked by a series of rapid growths and by a gradually increasing percentage of takes. It was transplanted into nine mice, of which two died in ten days, while in the others two, or 28 per cent., developed tumors. One of these died from the cancer; another (*6c*) had a transplantable tumor in eighteen days, and this, when transplanted into twenty mice, yielded 65 per cent. in twenty, thirty-nine and eighty days. In the latter case (*7d*) there is considerable evidence to show that the tumor was held back by the resistance of the mouse host, for the malignancy of the same tumor material was shown by the rapid growth of *7c* and by the fact that *7d*, when transplanted into a new batch, gave rise to 77 per cent. of takes and all within twenty-eight days (*8b, c*).

At this period in the history the curve becomes complicated through the converging of lines but they all show a certain optimum of development followed by a fall and this by a renewal of growth. The tumor *7c* is a good average example; this, when transplanted into series eight gave 88 per cent. of takes, some (*8c* and *8x*) in 21 days, one (*8b*) in fifteen days and one (*8r*) in twenty-six days. None of the mice inoculated died within ten days. The history of this set of tumors varies somewhat in the different cases; in some the division energy of the cancer cells decreased immediately, in another it decreased only after the following transplantation. Following out the history of *8c*, we see from the diagram that, upon re-inoculation into a fresh batch of eleven mice, none died within ten days while seven, or 80 per cent., developed cancer, *9d*, in thirteen days, *9e* in twenty-four, two others in thirty-eight and two in forty-one days. Many of these were used for experiments, but two of the rapidly growing ones were transplanted (*9d* and *9e*). In both cases there was a marked decrease in the division energy of the cancer cells: *9d*, which had developed very rapidly (thirteen days), was transplanted into six mice of Series 10, one of which died within ten days, while only two tumors or 33 per cent., developed, these requiring twenty-five days. One of these two (*10e*), upon reinocu-

lation into fresh mice of Series 11, gave rise to 61 per cent. of tumors, two of which (11*f* and 11*g*) were used for experiments, the first developed in twenty-nine days, the second in seventy-seven.

Turning back to 9*d*, which had the same ancestry as 9*e*, there is the same evidence of depression in the energy of the cancer cells coming from 8*c*. Tumor 9*d* was transplanted into sixteen mice, of which six died within ten days, while 66 per cent. developed tumors, of which the greater number were used for experiments, all developing within thirty-one days. One (10*a*) was used for further transplanting into Series 11; it was ready for inoculation in nineteen days and was put into twenty-six mice of Series 11. Of these four died within ten days, while ten, or 43 per cent., developed cancers, 11*c* in eighteen, 11*a* in thirty days. 11*a* was inoculated into ten mice, of which eight, or 80 per cent., developed tumors. Its history, therefore, is identical with that of 10*e* except that it was one generation behind the latter. There is the same lull in the division energy and the same recovery, and the same rhythm in infecting power.

All of the tumors described are to be traced back to tumor 8*c*, which came from the cancer cells in 7*c*. A very similar history is shown in the case of tumors coming from 8*b*, likewise derived from 7*c*. Here again the general result is a high percentage of takes with short periods of growth, or in general, a high virulence of the cancer cells. 8*b* was developed and ready for transplantation in fifteen days when it was put into twenty mice of the ninth series; none of these died within ten days, while eighteen, or 90 per cent., developed tumors, many being used for experiments of one kind or another, while four were transplanted into batches of the tenth series. The periods of development of the thirteen tumors were for the most part relatively short; 9*a* and 9*x* requiring only fourteen days, two others eighteen days, 9*b* and 9*c*, twenty days, three others, twenty-three, others thirty, thirty-four and forty-four days, respectively. Of these 9*a*, 9*b* and 9*c* were used for further transplantation and their histories are remarkably similar. 9*a*, when inoculated into mice of the tenth series (10*d*), gave 75 per cent. of tumors which required from twenty-five to forty days to develop, and these tumors were used

for experiments. 9*b*, when transplanted, gave a small percentage (43 per cent.) of takes (10*f*). There was, therefore, a well marked decline in the division energy of the cancer cells and the one tumor required twenty-eight days to develop and this, when transplanted into another batch of mice, caused their death inside of ten days. Of this ninth series, the tumor marked 9*c* was the most successful and also the most remarkable; it was transplanted into thirty mice of the tenth series, of which three died within ten days, while twenty, or 80 per cent., developed cancer in from fourteen to twenty-seven days, all rapidly growing tumors, two of which (10*b* and 10*c*) are given in the curve, the former developing in fourteen days, the latter in twenty. Each of these tumors, when transplanted into new lots of mice of the eleventh series, gave reduced percentages of takes. Tumor 10*b* fell to 62 per cent., 11*b* and 10*c* to 70 per cent. The progeny of 10*c* were used for experiments, while 10*b* was used for further transplantation. It was put into twenty-four mice of the eleventh series, of which none died, while fifteen, or 62 per cent., developed tumors as follows: 11*b* in seven (sic) days, another in twenty-four, 11*d* in twenty-six, others in twenty-seven, twenty-nine and thirty-two days, respectively. Of these tumors only 11*b* and 11*d* were used for further transplantation, the others going into experiments. Here, however, 11*b* is of especial interest, for upon inoculation into six mice of series twelve, 100 per cent. developed tumors (12*a*). Of these, one recovered spontaneously, while the others, when inoculated into new batches of mice, caused the death of all the latter within ten days (?). This malignant strain was thus brought to a speedy end.

The other strain from 10*b*, carried in mouse 11*d*, had a better fate. It was a more slowly growing tumor, requiring twenty-five days to develop. This tumor, upon transplantation in sixteen mice of series twelve, gave rise to 94 per cent. of takes in from twenty to twenty-eight days. Most of the resulting tumors were used for different purposes but one, 12*b*, which required twenty-five days, was again transplanted into thirty mice of series thirteen, one of which died and 65 per cent. developed cancer in periods varying from twelve, fourteen, eighteen, twenty-three and thirty-one, to ninety-four days. Most of these were not followed

up, one only, 13, which required thirty-one days, was transplanted into eight mice of the fourteenth series, giving 66 per cent. in long periods of development (56 to 69 days).

Anyone who follows through these tedious details will see that the cancer cells contained in the tumor-bearing mouse, *7c*, all had the same history of high proliferative energy followed by a decline. In all cases followed out, this decline is followed by a sharp rise in division energy and in the percentages of takes. Sister cells of tumor *7c* formed the tumor in *7d*, but required a much longer period (eighty days) to develop. Although slower, these tumor cells had a high potential of division energy, as shown by the fact of high percentages and quick periods in the eighth and ninth series. The tenth series, like the tenth series in the allied strain, brought a decline, thus marking for this strain a similar rhythm of growth energy.

The further history of the transplantations needs no special analysis; as the curve clearly shows, there is a continuation of the rhythms of infectivity, the average of which remains high, while the time element becomes much longer, until the curve now has the aspect of having been pulled out at the ends and concentrated in the middle.

It is hardly conceivable that this rhythmic development of the cancer cells is only artificial, due, that is, to the fact of inoculation into particularly susceptible mice, of which, according to Bashford, young mice offer the best examples. Such an explanation might be satisfactory for one or two instances of the phenomenon, but recurring regularly as it does, the phenomenon probably signifies something fundamental. In a developing embryo the rhythms of growth energy of the individual cells do not indicate a cessation of growth for the organism as a whole, for while some of the cells are resting others are dividing and developing. The energy of growth is applied sometimes in this sometimes in that group of cells. In cancer, however, there is only the one type of cells to develop, and appearing in different batches of mice the phenomenon cannot be attributed to the source of nutriment of the cancer cells, but must be looked for in the cells themselves. As previously stated these cells must be regarded as complete organisms, satisfying all of their physiological needs through

their own physiologically balanced activities. The source of the alternating rhythms must, therefore, be sought in the cells. In other and possibly analogous cases of complete cellular organisms the cause of the alternating periods is looked for in the variations of the physiological activities. Thus in the *Paramecium* experiments already mentioned, high division energy of the individual cells is followed by a gradually lowering rate of division until it is reduced to nil. At such periods of depression it was found that the cells could not reduce the highly stable condition of the protoplasm to a more labile condition, and that they evidently lacked the power of oxidation, or of forming the oxidative enzymes. This condition was relieved by the use of certain salts acting as stimuli; by them the labile condition was re-established and divisions in rhythmic waves of vigor again ensued (see Diagram 1).

In the *Paramecium* cycle there was nothing to interrupt the dividing activity of the organisms save the ordinary course of vitality. With the cancer cells there is always the struggle to maintain an existence against what must be adverse conditions. The division energy of the cells is retarded by such conditions, a result best shown in the early periods of the transplantations before the cells became adapted to the strange soil. The same phenomenon is manifest in the culture of *Paramecium*, a few days being required for the cells to become adapted to the culture medium. They seem to survive well enough in the medium, but they do not divide with such regularity during the first few days as afterwards when well established. The difference is due to the density of the fluid medium in which the organism finds itself rather than to any change in food. And so it may be with the cancer cells; they have the same source of food in the new mouse to which they are transplanted, but the environment is a little different and it requires some time for them to get started. Once started, however, there seems to be but little change in their potential of infectivity, although the periods of development differ to some considerable extent, the difference probably being due to the protective reactions on the part of the host mice. This is shown well in Diagram 2, where the periods of development in days are contrasted with the percentages of takes in the different

transplantations from start of the tumor to the present. The plotted curve shows that as the number of days required for development in the successive periods decreases, the percentage of takes increases with great regularity, until, when once established, it is maintained regardless, apparently, of the length of time required for development. This fact indicates that the cancer cells are endowed with a like power of infection, but that the host animals exert a retarding influence upon their development. All cancer cells cannot be expected to develop, hence it is too much to expect 100 per cent. of takes all the time; those cells maintain their existence which are endowed in the parent tumor with the most advantageous equipment for growth. This is not to be expected in imperfect cells, or in degenerated cells, but in those having the full complement of cell organs, normal number of chromosomes, division energy and the like. The success of such cells may be compared with that of the gametocytes of the malaria organisms; these are endowed with some property through which they are able to withstand the digestive fluids of the mosquito's gut, while all other forms of the malaria organisms are digested. So with the cancer cells those persist which have the proper attributes and these attributes are apparently developed with some degree of periodicity. Is there any evidence to indicate the nature of these particular attributes?

The cancer cell gets its nourishment as do other epithelial cells; there is little evidence to support the belief of Ehrlich that they make use of a specific *Nahrsubstanz,* although they are undoubtedly so modified as to take up more nourishment. They are bathed by the same fluids, and are subject to the same general conditions of metabolism as other epithelial cells. Other epithelial cells, however, do not multiply beyond the limits of organic regulation; these cells do and they are cancer cells because of this power. Other normal epithelial cells, beyond one or two divisions, do not multiply upon transplantation into other mice. The cancer problem, therefore, has to do with the specific attribute which distinguishes the cancer cells from these other epithelial cells, and we are again brought back to the question — what is the origin or source of the stimulus which causes this infectivity combined with the increase of the division energy? The

conditions of the environment of cancer cells in new batches of mice cannot account for the stimulus to continued development in successive transplantations; if this were true the percentage of takes and rapidity of growth would be quite as extensive on the first transplantation as in the later ones. This, also, would be the anticipated result if the cancer cells have that vigor of growth which should accompany them if they were embryonic tissue cells, or cells recently stimulated by some initial stimulus, or cells recently fertilized. The cancer cells must carry with them the sources of their stimuli, and these stimuli must be the same, both in the primary tumor and in the continued development of that tumor's cells, for we cannot conceive that each new batch of mice into which the cancer cells are transplanted provide the same identical physiological conditions as those of the first mouse in which the cancer was a primary tumor. Furthermore we cannot conceive any reason why, if the proper physiological conditions were present, there should be rhythmic variations in their production in different sets of mice, hence the conclusion seems inevitable that the source of the stimulus to development is within or associated with the cancer cell itself.

In the entire realm of biology there are few analogues to this condition of affairs. The favorite hypothesis of the medical profession — the Cohnheim theory of embryonic tissue rests as the cause of cancer, cannot stand the biological test. Leaving out of consideration that entirely unexplained set of questions having to do with the position and conditions of such cells during the periods of growth and maturity, the cancer cells, after the tumor is started, have none of the attributes peculiar to embryonic cells. Mere power of proliferation is not a sufficient characteristic, while the fundamental characteristics of embryonic tissue cells are usually entirely ignored by the advocates of this theory. These conditions are somewhat more subtle than are the ordinary manifestations of vitality, but they are none the less potent. I refer to the properties which all embryonic cells have of differentiation combined with coördination and self-regulation. Cancer cells have none of these; there is no evidence of differentiation although mountains of mouse tissue have been grown from the cell progeny of the original Jensen mouse. The absence of any

regulation and of all coördination and of adaptation to the needs of an organism as a whole which is the goal of all embryonic cells, is evidence against the hypothesis. All of these factors are characteristics of embryonic cells, and to the biologist they are the most important and the most characteristic. No theory of embryonic tissue satisfies the conditions of increased vitality and vigor of growth shown by this Jensen tumor, and we must look in other directions for its origin.

Nor can the tumor origin be traced to any detached cell, which, freed from its supporting and regulating membrana propria, starts off on an independent career of lawless development. This theory of Ribbert postulates the metamorphosis of an ordinary epithelial cell into a parasite endowed with a potential of indefinite vitality and development. It does not account for the origin of the stimulus to the latent division energy, much less does it account for the perpetuation of that stimulus. Here, too, lies the difficulty with the theory of chemical stimulation which Marchand has elaborated. There is no evidence that an initial stimulus can continue to act in this direction indefinitely, the impetus given soon wears off, and the gradually increasing vigor of a tumor like that of the Brooklyn mouse, is evidence quite strong enough to indicate that the stimulus, whatever it is, acquires strength rather than loses it.

The evidence, finally, as I interpret it, shows that the cancer cell carries with it into each new mouse into which it is transplanted its own stimulus to division. Furthermore this stimulus presumably issues from a foreign organism rather than from an integral part of its own protoplasm, or from a product of its own metabolism; the very definition of a stimulus involves the idea of an external origin. We are thus driven back by these considerations and by the facts of infectivity as shown above, to the last resort of a biologist or pathologist, viz., to the suggestion that *the cause of the division energy lies in the stimulating poison from some self-contained and ordinarily invisible micro-organism whose rhythemical variations in vitality may, possibly, account for the rhythmic variations in infectivity.*

In this connection we find one of the very few analogues of cancer cell growth, the formation of a vegetable gall where the

latent division energy of the plant cells is stimulated to renewed activity by a poison secreted by an insect. As often pointed out, however, this is only a far-fetched analogy, for the stimulus comes to an end, and the division energy wears off. A more significant case is the formation of tumors on the roots of certain plants like the cabbage and its allies. Here, in club root, the parenchyma cells of the root are entered by a minute protozoan parasite. The organism multiplies in the cell protoplasm, which reacts to the stimulus of the parasite's presence, and divides. The division is repeated until great tumors are formed, parasite and protoplasm meantime living amicably together in symbiosis.

As all attempts to explain the cause of cancer must at the present time be of the nature of tentative of working hypotheses, the suggestion of an ultra-microscopic or unrecognized organism is not out of place, the value of an hypothesis being measured by the number of phenomena which it accounts for. The old arguments in favor of the parasite theory of cancer, familiar to everyone conversant with the subject, apply in the present case. Cage infection, early noted by Borrel, observed by Giard, Ligniéres, Michaelis, in the Buffalo laboratory, etc., finds its interpretation in such an hypothesis. The infectivity of cancer cells, a phenomenon by which these cells differ from ordinary epithelial cells treated in the same way, is added evidence which finds a counterpart in the tumors of club-root type. Contrasted with these are tumors like vegetable galls, certain benign tumors and embryonic tumors of man, in all of which there is a well-defined division energy of the cells involved, but no infectivity on the part of these cells. In club root and in cancer, division or growth energy is accompanied by clearly defined infectiveness. In club root infectivity is due to a contained parasite, and the growth energy is attributed to the stimulus from that parasite.

In cancer we have found no parasite confined exclusively to cancer tissue, but analysis of the growth energy and the phenomena of transplantation give evidence to show show that infectivity and division energy of the cancer cells are not one and the same thing and that each has its own variations. The growth energy or division energy of the cancer cells, measured by the periods required for growth in successive batches of mice, affords

no evidence of rhythmic development such as we find in embryonic cleavage cells or in free living organisms like the protozoa; there is, in all probability, such a rhythmic growth but it must take place in the individual mouse if at all. The infectivity, however, shows a regular rhythm which cannot be attributed to the reactions of mice in batches or lots of varying number, but this periodicity may be explained as the regular variations in vitality, similar to those of paramecium, oxytricha or tillina of a parasitic organism.

Many parasites have been assigned to the human cancer cells. Protozoa of all types have been held responsible by one or more investigators, but in no case have the claims been made good. The various morphological products of epithelial or blood cells that have been called parasites have served only to weaken the hypothesis of the parasitic organ of cancer, which, with its power of indefinitely continued proliferation is a very different thing, biologically, from a benign tumor.

It is certainly conceivable that a parasite of cancer may be too minute to be seen with the technique at our disposal. At the present time we know a great deal about the yellow fever organism; we know the period of incubation it requires in the human blood; we know that it requires from twelve to fourteen days to develop in the body of a mosquito before the latter is able to transmit the disease; we know that the disease cannot be transmitted in any other way, and yet, knowing all of these things, the organism of yellow fever has never been seen. It will pass through the finest filters, and belongs, therefore, to a group which we must perforce, until they are actually seen, consider as ultra-microscopic organisms. Such parasites might be adapted to life in the epithelial cell as well as the organisms of club root are, and there in the protoplasm might easily be overlooked. It has been suggested that a species of *Spirochæta* is responsible for yellow fever, and spirochætes have actually been seen in the kidney of yellow fever victims. But they apparently do not exist as such in the blood or in the mosquito. We know nothing about the life history of the spirochætes as a group; if it is analogous to the life history of most protozoa we might well look for stages in which it is of ultra-microscopic size.

We continually find spirochætes in mouse cancer and it is not improbable that we attach too little importance to them. We find furthermore a certain relation between the virulence of mouse cancer and the numbers of spiral organisms present; in highly virulent strains the tissues are infested with the parasites and it is not beyond reason to assume that the rapid death of batches of mice inoculated with virulent cancer cells is due to these spirochætes. Nor is it inconceivable that the parasites increase the susceptibility or prepare the soil, so to speak, in a new host for the growth of the cancer cells. On the other hand, the same or a very similar spirochæte is found in mice not infected with cancer, a fact which weakens any theory that the spirochæte is the direct cause of cancer, although the fact is not fatal to such a theory. A more serious objection is that no spirochætes are found in human cancer, but the objection might be met with the argument that spirochætes may have been present at the outset to prepare the soil and to provide the stimulus to the potential dividing energy; furthermore, we do not know that human cancer is transplantable. The rhythms of infectivity, finally, may be due to the variations in vitality of these spirochætes.

Summary

In conclusion we may summarize the above biological observations in a series of theses as follows:

1. Cancer cells differ from other epithelial cells in respect to: (*a*) Size relations of nucleus and cell body; (*b*) power of indefinitely continued division.

2. Cancer cells differ from embryonic cells in absence of: (*a*) power of differentiation; (*b*) power of coördination of parts to whole; (*c*) power of self-regulation and limit of growth.

3. The continued development of the cancer cells is subject to the following factors: (*a*) The inherent potential of division of the cancer cells; (*b*) the natural resistance of the inoculated animals. The latter factor is usually regarded as the index of malignancy of a tumor and is based upon the percentage of takes together with the period required to kill the mice. Our experiments, however, show that the percentage of takes is independent of the time factor, and indicates the presence of a third factor

which may be described as (*c*) the potential of "infectivity" of the cancer cells.

4. The potential of infectivity of cancer cells is characterized by more or less regular rhythms; these must be distinguished from rhythms of growth energy of the cancer cells which in all probability occur within the individual mouse. Without the division energy of the cancer cell this infectivity is inoperative, hence it follows that the cause of the infectivity lies within the cancer cell or is constantly associated with it.

5. Cancer cells differ from epithelial cells by virtue of this potential of infectivity combined with that of division energy. There is reason to believe that the latter is due to the action of stimuli and not to the liberation of a restrained growth power of embryonic tissue. There is reason to doubt that an initial and discontinued stimulus is responsible for these attributes of the cancer cells. Certain benign tumors, or vegetable galls, may be due to the action of such initial stimuli, but in them there is no infectivity. Embryonic tumors, due to embryonic cells, have a high power of differentiation combined with their division energy, but there is no infectivity. Infectivity distinguishes all cancerous growths from normal epithelium and from benign tumors or teratomata.

6. The rhythms of infectivity of cancer cells, erroneously regarded as rhythms of growth energy by Bashford, Murray and Bowen, appearing as they do in successive batches of mice which we may legitimately assume to have like powers of resistance, must have their cause in the cancer cells themselves. These cells, therefore, must be equivalent to parasites, or else parasites are contained within or associated with them.

7. Upon any other hypothesis it is difficult to conceive of cells creating a continual stimulus to their own growth energy, and it is still more difficult to explain the rhythms of infectivity.

8. Many lines of evidence point to the presence of some possible organism within the cancer cell; some organism which, acting as does *Plasmodiophora brassicæ* within vegetable cells, underlies the infectivity of cancer cells and provides the stimulus for their continued proliferation. Upon such an assumption the numerous cases of cage infection find their explanation.

9. The various inclusions of the cancer cell which have been described as organisms have been disproved; yet the analogy of club root and the many filter experiments show that the cause of infection may lie within the cancer cell. It is conceivable that, like the yellow fever organism, such an incitant may be in the protoplasm and beyond our powers with the microscope to locate.

10. The spirochætes which we have found in mouse cancer may have something to do with this infectivity of cancer cells. They may be useful in preparing the "soil" in new mouse hosts and making it susceptible to cell growth; or they may have intracellular stages in their life history which are too minute to be seen. The rhythms of infectivity, finally, may be an expression of the vitality of these spirochætes or of the hypothetical ultra-microscopical organisms accompanying cancer cells.

PROCEEDINGS OF THE CONFERENCE

OF

SANITARY OFFICERS OF THE STATE



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xceedings of the Seventh Annual Conference of Sanitary Officers of the State of New York, Convention Hall, Buffalo, October, 16-18, 1907

he Conference was called to order by Ernest Wende, M.D., Health Comsioner of the city of Buffalo, Wednesday, October 16, 1907, at 2 p. m.

OPENING ADDRESS BY DR. WENDE

[have been requested by the Honorable Eugene H. Porter, alth Commissioner of this great State of ours, to call to order s Seventh Annual Conference of Sanitary Officers — a duty ich to me is a great pleasure.

If Dr. Daniel Lewis, the Father of the Conference, were present, would find in its development an agreeable surprise. The Conrence now occupies a unique position in sanitation and it is mposed of potent factors which often those most familiar with its hievements would fail correctly to estimate.

We, as health officials, impelled by a desire to co-operate in the ecution of sanitary regulations, have come together to devise ays and means of advancing sanitary knowledge and widening e sphere of its application and to determine what methods and gencies should be encouraged, what avoided or reformed. At any te we have assumed the position of a sanitary tower and it is ear that our destiny is to be wrought out in co-operation.

DDRESS OF WELCOME BY THE HON. J. N. ADAM,

Mayor of Buffalo

As mayor of the city and speaking for all the people of Buffalo, id you welcome! It is a high bid I offer, in the highest possible ms, and the acceptance of it will afford us great gratification.

[greet you as Socialists of an exalted order, as advocates of the mon good, as believers in the doctrine of 16 to 1, on the ground he truth of the old adage that an ounce of prevention is worth a nd of cure! You come among us as children of wisdom carry- in your right hand length of days. You come among us, not onsider only the remedy for our physical ailments but to dis- er the causes of them, and by killing the cause to destroy the ct. We look upon you as our benefactors, and our gratitude is

voiced in my welcome. There is a disease which cannot be cured, for its seeds are planted with our birth. It is sometimes called "Anno Domini," but it may have an earlier or a later date of maturity and your efforts to have us get as great an extension of time as possible are highly appreciated.

Sickness is one of the great burdens of society, to the watcher as well as to the sufferer, and whatever can be done to prevent it ought to be done. Whatever can be done to prevent the inception of disease ought to be done. Whatever can be done to prevent its spread ought to be done. Whatever can be done to eradicate it ought to be done. Much has already been done to this end through the enactment of laws. The necessity of pure food, pure air, pure living has been recognized as a factor in the prolongation of life.

If these laws are schoolmasters to lead the people unto health they will have to be shown that it is the spirit of them that leadeth thereto, and that observance is essential to effectiveness. Get the people with you, gentlemen, get them to see that the work you are doing is in their interest and for their good and your task is easier. The people know that you are not seeking to make them healthier in order to make yourselves wealthier. They do not all know how wide the scope of your work is and how laborious it is, and I may add how little you get for it. There may be some drones in your departments who receive full compensation, but the years of close study required to fit the kingbees for their places are seldom taken into account. The quiet, steady, and necessary work in the laboratory is overlooked. The poring over microscopes, watching the growth and development of those organisms — what do you call them? Bacteria or bacilli or what? I have read that they are called germs in Germany, parasites in Paris, microbes in Ireland, and cultures in Boston, but whatever they are called, they need close attention and scientific knowledge if their subjugation is to be accomplished. Then the butchers and the bakers and the plumbers and the milkmen and the hucksters have all to be looked after, and even the doctors whose chief business it is only to cure, and many of whom you hope to put out of the business by preventive measures, have to be supervised. The inspection of school buildings and the examination of school children should receive more attention than has hitherto been given to them. But, gentlemen, I am not going to anticipate all the matters upon which you have convened to deliberate. I have already gone beyond the [illegible] bounds of an address of welcome. I trust that your stay in

Buffalo will be pleasant as well as instructive, that your Seventh Convention will be better for you and for us, than any that has preceded it. The Mosaic Laws of Health stand unrepealed to-day. The Greeks subordinated theirs to physical beauty, the Romans to physical strength, Modern Europe has made progress in the study of hygiene, but I believe it remains for the United States of America to show to the world an example of the highest and best effort for the amelioration of human suffering and the promotion of human happiness in checking the ravages of disease by mastering it in its incipiency, and I am sure you will nobly do your part.

ADDRESS OF WELCOME BY MR. WM. H. GRATWICK,

President of the Chamber of Commerce of the city of Buffalo

I feel unusually honored, in being given the opportunity of welcoming to Buffalo such a gathering as this is. Representing the Chamber of Commerce during the past three years, I have had the pleasure of addressing many important conventions which have come to this city, but I do not think that I have ever been called upon to welcome a convention that represented more important work for the general welfare than does this Convention here assembled to-day.

We here in Buffalo feel proud, and justly proud, of the results that our department of health has accomplished under Dr. Wende and his assistants. Buffalo is a better, cleaner, and more healthful city by reason of the untiring and faithful work done by our local health department; and speaking as a citizen, I sincerely hope that the results accomplished will, during the next few days, be brought fully to your attention.

Those of us who know industrial Buffalo are gratified at what we have to show, and at the results that have been accomplished during the past few years. We are located here at the end of the Great Lakes, the greatest inland waterway in the world, and we are also the western terminus of the Erie canal. We have cheap and almost unlimited electric power; and we have harbor facilities and shipping facilities unexcelled by any city in the world. We have had, during the past few years, a remarkable industrial growth. During the next few years we expect even greater development.

I should like to have every one of you gentlemen go up to the top of our new Chamber of Commerce Building and see the city from this vantage point. You will see a large expanse of territory, a

great many tall chimneys, and a good deal of smoke and soot. In that such an exhibit means industrial activity, we are proud of it, but in this connection I shall also ask you to look at the chimney of our own building. In this building we are furnishing heat, light, and power for a number of buildings and enterprises around us, and we are generating steadily over four hundred horse-power. I want you to see in this connection what can be done toward a cleaner city by modern methods. You can see what the result with us would be without such methods if you are fortunate enough to catch a time when they are changing from one machine to another. At such times, for a few seconds, a volume of smoke comes forth that is almost incredible, and it would be this way every hour of the day were it not for the precautions which we have taken.

This industrial progress of the past, and the industrial progress that we confidently expect in the future, mean an increased complexity in hygienic problems. You may feel assured, therefore, that as this city expects to become more than ever important industrially, we are in the same way more than ever interested in the work that you are doing.

Gentlemen, for the Chamber of Commerce, I extend to you a hearty welcome, and I hope that your stay here may be so profitable and enjoyable that you will all want to come again.

ADDRESS BY EUGENE H. PORTER, M.D.,

State Commissioner of Health

INTRODUCTION

A welcome so cordial, so generous, and so keenly intelligent renders it difficult to adequately express our appreciation. It is not a welcome of words alone, it is a welcome of deeds, for we all recognize the enthusiastic work that has been done by Dr. Wende and his associates and the public-spirited citizens of Buffalo, without which one-half of the influence and effect of this Conference of ours would never be attained. I think we can congratulate the city of Buffalo on its public-spirited mayor, on its efficient health officer, and on the intelligent co-operation of its citizens in sanitary work.

I believe that this welcome of yours, carrying with it the idea of efficiency in sanitation, will reach out through the State and be of the greatest educational value in our future work. Gentlemen, I thank you for your welcome.

ADDRESS

We are gathered this afternoon to inaugurate the Seventh Annual Conference of the Health Officers of the State of New York. This is a day of salutations. We are met here to greet a new sanitary year, to welcome those who have come to join our ranks, and to exchange words of encouragement with one another. It is well that from time to time the principles that govern this Conference, the traditions that affect it, the aspirations that move it should court the fullest inquiry. For the Conference is to a great measure representative of the Department. That which moves the one, moves the other. If there is development and advancement here, there is you may be sure progress and fruitfulness there. But if our teaching has hardened into dogmatism, our precepts into formulas, and our system into routine, then is our custom a yoke, not of freedom but of bondage. We have fallen somewhat below our standards. For in our day we are restless, drawn by a discontent not always divine, dragged down by laxity, selfishness, and the tremendous materialism of the age. And besides all this there remain the monumental words of the first and greatest physician of western civilization, "Life is short, and art long, occasion fleeting, experiment fallacious, and judgment difficult."

But while the road is difficult and advance not easily won, knowledge is greater, conviction clearer, purpose more resolute, and accomplishment nearer.

And so if our meeting here shall be a fresh incentive to continued labor, if it shall bear a particular and special message to each listening ear, and if, in addition to that comradeship so enjoyable, and that living sense of power through unity of organization so essential, it shall bring to each of us a more complete realization of the problems that confront us, a wider and keener mental vision, an inspiration leading to better public service, the purposes of this Conference will have been fully attained.

This is the largest gathering of health officers ever held in this State or for that matter in any other State in the Union, and that it is so is due to the untiring devotion to public duty and the constant enthusiastic interest in sanitary affairs always manifested by the Health Officers of the Empire State.

In greeting you this afternoon I find some difficulty in adequately expressing how much your presence here is appreciated and how fortunate we esteem ourselves that we have the opportunity to meet so many of our coworkers in sanitary matters.

The Conference extends its heartiest greetings to our good friends, the citizens of Buffalo. This splendid audience is an index of the public spirit and intelligence of the people of this municipality, and in sanitary as well as in other things Buffalo is certainly a city of the first class.

Some Special Department Work

It has seemed to me that the best use of my brief period of time would be to tell you some of the things we have done since the last Conference and then discuss briefly a few important matters that closely concern next year's work. So much has been done compared with anything we were able to undertake before that I can hardly do more than mention some of the many lines of endeavor entered upon.

1. THE INVESTIGATION OF SUMMER RESORTS

Has been continued and a large number of hotels have been personally inspected. The reports secured by the blank forms sent out last year to the owners of summer hotels and boarding-houses have been thoroughly studied and tabulated, and where the conditions are unsatisfactory and possible or probable danger threatens visitors measures have been taken to correct the evils. The number of summer resorts in this State is enormous, and to properly supervise their sanitary condition requires more money than is now available. I hope next year, however, to approximately complete this work and so prevent many cases of "summer resort typhoid."

2. SANITARY INVESTIGATIONS OF VARIOUS CITIES

It is not enough to tabulate death returns. These melancholy statistics taken in bulk do indeed serve to remind us of "that bourne from which no traveler ever returns," but afford very little other information of practical value.

But when intelligently studied, they are employed for purposes of comparison and the results attained interpreted by the sanitary methods of to-day, they may serve as beacon lights pointing out existing danger and demanding its avoidance. So the dead shall speak to us, and these voices from the grave may not be lightly disregarded. And when it was found that in one of the cities of this State the average annual death rate from typhoid for ten years was

138 — in another 87 — in another 82 — in still another that the mortality from tuberculosis was three times what it should be, and in still another city the conditions indicated by the tables pointed unmistakably to an epidemic outbreak of disease, it needed no labored argument to convince me that one of the urgent duties right before the Department was the correction, if possible, of these conditions. And so we have begun this summer a sanitary investigation of the conditions existing in various towns and municipalities in this State. In this study were included the water supply and all possible existing sources of contamination; the method of disposal of sewage; the method of garbage disposal, if any; the chief occupations of the people; the number and kind of manufacturing or other industrial establishments; the number and character of tenement-houses; together with many other matters bearing relation to the general investigation. Some of these investigations are completed, others are still under way. When these reports are finally passed upon the Department believes that it will be able to give to each of these municipalities specific and substantial aid in correcting the very serious existing dangers to health and life. It will not only point out the evil that exists but it hopes to be able to suggest the adequate remedy, and it will use all the influence and moral force at its command to effect a change for the better. But the Department does not undertake to do the required work. The town must work out its own sanitary salvation. The Department investigates, studies conditions, suggests, gives expert advice, points out the way. The rest of it belongs unmistakably to people dwelling where the conditions exist. And this, it would seem, is one of the most important functions of your department of health: to give to any town or municipality needing it expert advice and aid in the avoidance of sanitary perils and their speedy correction, if in existence. It will be readily seen that such work as this required much time and considerable expenditure of money. But we went as far as we could.

3. THE POLLUTION OF OUR STREAMS AND LAKES

This is one of the most important and difficult questions before us. It is obvious that a problem so serious, affecting so many and varied interests, must be dealt with in a broad and comprehensive fashion. As a basis for such treatment positive information is needed. It became, therefore, imperatively necessary

to thoroughly study all the principal watersheds of this State. This work included the present pollution of streams, their suitability as sources of water supply, the wastes from factories and creameries, the refuse from pulp mills, and many other important facts. Sanitary maps have been prepared of many of these watersheds on a scale to show plainly each stream of appreciable size with the location of each source of water supply, and all important sources of pollution. The Oswego, Upper Hudson, Lower Hudson, Susquehanna, Genesee and Niagara watersheds are now practically completed.

4. EXAMINATION OF ALL PUBLIC WATER SUPPLIES

It has always seemed plain to me that one of the most legitimate functions of the State Department of Health was a continuous and efficient supervision of public water supplies. The work done by Massachusetts in this line has been most excellent and far ahead of anything we have ever been able to do. But the increased appropriation in the supply bill rendered it possible to begin this important work, and every public water supply in the State has been examined and reported on. These examinations will be repeated at regular and necessary intervals, and where the supply is contaminated the cause will be removed as promptly as possible. Hand in hand with this work goes the

5. INVESTIGATION OF ALL SEWAGE DISPOSAL PLANTS

The value of a sewage disposal plant depends upon its efficiency. The quality of the effluent tells the story. So every disposal plant has been examined and every effluent has been analyzed. The results of these examinations will be used where indicated to better conditions.

6. EXAMINATIONS OF THE EYES AND EARS OF SCHOOL CHILDREN

Last year, you will remember, it was stated that the Department had in mind the institution of an examination of the eyes, ears, noses, and throats of school children. This, of course, was to be done with the co-operation of the Education Department.

I am very glad to announce to you that the plan proposed last year by Dr. Schenck, with some slight modifications, goes into operation this fall in 450 high schools of this State. As Dr. Schenck will tell you a little later just how all this is to be done, I will not go into details.

7. EXAMINATIONS OF NEW SERIES OF MEATS

The report of the laboratory on the first series of samples of meat products excited much attention and had a most excellent effect. A second series of samples of meats has been collected and examined, and the full report will be published in a short time.

8. ANALYSIS OF BEERS, ETC.

A large number of analyses have also been made of beers, wines, and whiskies, which will shortly appear in the Bulletin. No appropriation was made for these examinations, but it seemed necessary to make them, and the expense has been paid from the general fund.

9. TUBERCULOSIS EXHIBITION

Another line of special work undertaken this summer is the Tuberculosis Exhibition, the first ever owned by the State, and the Hygienic Laboratory Exhibit, which is but the nucleus, it is hoped, of a much larger collection. The work of preparing these exhibits has been most onerous, the more so because of limited means, but the enthusiasm of Dr. Pease and his faithful assistants never flagged. It is our purpose to further perfect these exhibits, particularly the tuberculosis exhibit, and use it as a traveling exhibit for educational purposes. It is one of the things most sorely needed by the Department. Already we have received many requests from cities and towns to have it sent to them.

10. TRAVELING LIBRARIES AND BACTERIOLOGICAL OUTFIT

You will notice also in the exhibition here a collection of books and some apparatus for tuberculosis work. These are traveling outfits — the one a small collection of specially selected books on sanitation for the use of health officers, and the other a practical and always ready outfit for bacteriological work to be done on the spot where investigation and action are needed without delay. Although these things may not seem large, yet they are of no little importance because they will add materially to the efficiency of our work.

11. SPECIAL CIRCULARS

The very general interest now manifested by the more intelligent citizens of our country on sanitary matters is due not so much to the general advancement of scientific knowledge, by the arduous

labors of students and laboratory workers as it has been to the dissemination of this increased knowledge. If these discoveries of truth never passed beyond the closed doors of our laboratories or could only be found between the covers of technical pamphlets, their influence and power for good would be as nothing. They would be mummified truths — embalmed but not available. Education then must continue to be the watchword. Education in sanitation spells progress in sanitation and no positive and decisive advance may be made until our fellow-citizens are educated to the point where they are generally convinced that the advance must be made. So we have determined to begin the publication of a series of circulars and pamphlets on topics vitally concerning the public health, for popular distribution. Work on the first series has already begun and the topics and dates of publication will be duly announced in the Bulletin. It will be a very modest beginning, but we hope these little pamphlets will prove an important factor in our campaign of education.

What may be termed the first one of the series is the very complete and instructive prize essay by Dr. Knopf on the Treatment of Tuberculosis. This may be found at the registration office, and a copy will be given to each health officer attending the Conference.

* * * * * * * * * *

These then, my friends, are some of the things we have tried to do since our Syracuse meeting a year ago. Of course in addition to these lines of work, the routine work of the Department, which has quadrupled during the last two years, has been going steadily on.

Appropriations

Efficiency and appropriations — the union of affinities, the one a complement of the other, married by general consent — let no Legislature put them asunder.

For it ought to be true, even if it is not altogether so as yet, that no appropriation of public moneys should be made without a definite expectation of efficient and honest public service in return. To the question "What is the expense of a certain line of work?" must be added the significant inquiry "What service has been rendered for that expense?" But there can be no service without means; there can be only inadequate service with insufficient funds; there can be efficiency in its fullest sense when the appropriation is enough to meet actual needs. The last Legislature increased the appropriation for our Department by almost $42,000.

The Governor allowed every increase asked for by the Department and stated that he did so in order to increase the efficiency. This increase of income has enabled the Department for the first time to begin lines of work that could not be undertaken before because of the expense. But the appropriation does not as yet, by any means, meet the requirements. The total amount of money available for the Department, exclusive of the Cancer Laboratory, is still less than $100,000. We are still severely crippled in the amount allowed for "Investigations," for the "Division of Engineering," and for the "Division of Laboratory Work." I have no hesitation in stating that the efficiency of the Department is materially lessened and its administration hampered by lack of funds. Pennsylvania for the two years beginning June 1, 1907, has appropriated for its Department of Health — after the payment of the annual salary of the Commissioner, $10,000, and the salaries of numerous other officers, the sum of $1,459,312 — $400,000 of which is for "the dissemination of knowledge relating to the prevention and cure of tuberculosis." I may add that the appropriation made by Massachusetts also exceeds that of New York. All we want is enough to do thoroughly and well the work that lies before us.

Pure Food Law

The attitude of the Department regarding a pure food law was made so clear at the Syracuse Conference that it seems unnecessary to dwell upon the subject now. It perhaps is sufficient to say that the Department believes the State should have, without delay, a wise and practical pure food law, and that the enforcement of it should be placed in the hands of the Health Department.

The Cancer Laboratory

It is perhaps appropriate in this city of Buffalo, which contains as an offshoot of the Laboratory Division of the State Department of Health, the Cancer Laboratory, for a few words to be said on the subject of this most serious and intractable disease. It might be well if we advised the citizens of the State not to put too much credence in the newspaper reports as to the curability or incurability of cancer.

The laboratory here has been working faithfully and well on the problem of determining a probable cause for the disease. It is not concerned itself with attempting to find a cure. Its work, therefore, may not be popular, but it is scientific, and in the end

will accomplish more than would a search first in this direction and then in that, for possible remedial agents. When we have determined the cause of the malady, there is little doubt that a remedy will be forthcoming comparatively soon after.

It is true that deaths from cancer are increasing and the situation is a serious one, and the State has a right to impress its seriousness upon the laboratory here and urge that the money it appropriates shall show results.

In addition to exploiting various cancer cures, some newspapers have done considerable harm by publishing alarming articles on the contagiousness of cancer. Unfortunately the origin of those is to be found among some irresponsible members of the medical profession, who, not realizing the serious nature of their claims, and their far-reaching effects upon the general public, have drawn hasty conclusions from insufficient data, and have published in the medical press their immature opinions, more than suggesting the contagiousness of the disease. Such an announcement is eagerly seized upon by the sensational press, and the public, already educated by the physicians and sanitarians to accept specific germs as the cause of cancer, and to recognize the infectious character of germ diseases, have proved fertile soil for the spread of the idea that cancer is contagious.

We need to let the public know that there is no sufficient evidence as yet that this is the case.

Public Health Diploma

In the spring of this year I received from the Secretary of the Medical Society of the State of New York, a copy of a resolution passed by the Society at its last annual meeting. The import of this resolution was that it was the opinion of the Society that only those physicians should be appointed as health officers who could show evidence of special training in public health work. I want to say that the Department is in hearty sympathy with the spirit of this resolution, and is very glad to recognize the interest manifested by the medical profession in this State in matters of public health. There are, however, practical difficulties which must be taken into consideration.

I take it that those who framed the resolution and were responsible for its passage by the Society, had it in mind to secure in this State the adoption of the method in vogue in Great Britain and other European countries, in appointing medical officers of

health. Let us consider for a moment the requirements as they exist in Great Britain.

A candidate for appointment as a medical officer of health must be possessed of special qualifications, known briefly as the D. P. H., which stands for a diploma in public health. The examination for this diploma consists of two parts. Before the candidate can be admitted to part one of the examination he must be twenty-three years of age and have been a qualified practitioner of medicine twelve months, and after his graduation he must have had six months' practical instruction in hygienic chemistry, bacteriology, and the pathology of the diseases of animals transmissible to man. This part of the examination covers the following subjects: 1) Physics, in their application to health, and with reference to ventilation and heating; water supply and sewerage. 2) Chemistry, in its relation to air, water, food, soil and sewage. 3) Microscopical examination of air, water, food, articles of clothing and parasites. 4) Bacteriology, in relation to sanitary work.

Before admission to the second part of the examination, the candidate must show that after his graduation he has spent six months in acquiring practical instruction in the duties, routine and special, of public health administration under a medical officer of health in a community of not less than 30,000, and also has had three months' experience in a hospital for infectious diseases. The subjects embraced in part two of the examination are as follows: 1) Origin, pathology, and prevention of diseases, with special relation to infectious diseases. 2) Effects of unwholesome air, water, and food. 3) Diseases of animals in relation to the health of man. 4) Influence of occupation — unhealthy trades. 5) Influence of climate. 6) Sanitary administration in relation to requirements of houses and other buildings; sanitary engineering. 7) Construction, arrangement, and management of hospitals. 8) Statistics in relation to health. 9) Sanitary laws, including by-laws, orders, and regulations. 10) Duties of sanitary officers.

That every health officer should be possessed with the knowledge indicated in the above outline is a consummation devoutly to be wished. But under the present circumstances, it cannot be expected. In the first place, an investigation conducted by the Department has revealed the fact that there is not an institution in this State offering a course of postgraduate instruction cover-

ing these subjects. The prospectuses of the various medical schools show that hygiene and sanitary science are taught to students in their first or second years. The scope of the instruction is not as full as is necessary for the mental equipment of the health officer, if we are to put British standards in force; and, moreover, we all know from practical experience that the subjects taught in the first two years of a medical student's career are considered by him as very largely theoretical, and therefore of not sufficient practical importance for him to make really a part of his medical knowledge. If he retain sufficient to answer satisfactorily the few questions set by the State Board of Examiners, he considers he is doing well. Again, if opportunity were afforded for postgraduate instruction of the character I have outlined, it is a very serious question whether the recompense received by the majority of health officers would warrant them in going to the expense of obtaining a special training. I want to say, then, to the medical profession in this State that these two practical obstacles must be removed before the Department can adopt for its own the rules suggested by the State Medical Society. As to the first obstacle, the Department intends to do what it can to provide some opportunity for instruction in sanitary science and public health. During the past year sanitary institutes have been held by the Department in various parts of the State which have afforded opportunity for the acquirement of increased knowledge on the part of the health officers. But we recognize that we have only scratched the surface. The Division of Publicity and Education, however, is seriously considering the problem, and I hope to be able a year from now to make an announcement at our next annual Conference of plans for some special courses of instruction for health officers and those desiring to become such. If the Department accomplishes this, the medical profession must do its part, and I believe this part can best be the removal of the other obstacle to which I have referred. The organized medical profession in this country has recently shown its power in the matter of fixing the recompense for services rendered, by forcing some of the largest life insurance companies in this country to restore the fee which was granted for examinations prior to the recent enforced retrenchment in insurance circles. I want to suggest that this same power of the organized medical profession can well and rightly be employed in securing adequate recompense for the health officers throughout the State. With very few

exceptions, these public servants are miserably underpaid. They are the means of saving millions of dollars every year, and a fair premium on this saving would furnish adequate compensation for these faithful public servants. I would like to see the Medical Society of this State initiate a movement of reform in this matter, and I hope to learn by our next meeting that the subject has been well discussed in many medical circles. My answer, therefore, to the Medical Society of the State of New York, addressing me on the subject of requiring Evidence of Special Qualifications from Candidates for Appointment as Health Officers is, that the Department is willing and anxious to comply with the suggestion as soon as it is feasible to do so.

Typhoid and Pollution

A fact most gratifying to record is that, during the past two years, marked and increasing progress has been made in lessening the pollution of our rivers, streams, and lakes. That public sentiment is more and more actively supporting the position of the Department in this important duty is unquestionably due to the general dissemination of knowledge concerning the dangers of unrestrained pollution. It is a striking illustration of the fact that you must first educate and then advance. In some cases you educate by advancing. But in this matter, so far-reaching were its consequences, so many important interests, both public and private, were vitally interested, so many difficulties and peculiar embarrassments were in the way, that it was essential that the people should see as clearly as possible the imperative and urgent necessity for this sanitary reform before much progress could be made. That there is now throughout the State a general sentiment that our waters must be purified there can be but little doubt; when occasion arises it must be crystallized, specially informed, and wisely directed. It is needless now and here to again enter upon an elaborate discussion of the dangers of polluted and infected waters. If we estimate that 20,000 cases of typhoid occur in New York State in one year with 2,000 deaths, the money loss to the State is easily figured. Allowing each life to be worth $3,000, a low estimate, as the young and vigorous are most often victims, and estimating that 15,000 of the 20,000 cases were men and were kept from labor forty days, and putting the value of a day's work at $1.50, the total pecuniary loss to the State amounts to $7,000,000. We know

without telling what misery and suffering were caused by these thousands of cases, what grief and distraction occurred when death entered hundreds of homes; and to this must be added the very serious business loss of a community when the disease occurs in any way approaching epidemic form. Let us remember also the danger of infection by tuberculosis — a danger more serious and grave, I fear, than it is at present supposed to be. Then, too, when the stream is not infected the conditions of pollution existing cause a disfigurement of its natural features often peculiarly repulsive. The banks are covered with deposits offensive to both sight and smell; dirty and slimy scum floats on the surface of the stream and accumulates in eddies and coves; the bed of the river is covered with a viscid material that rises promptly when disturbed, and yields to the grieved nostril a pungent odor peculiar to itself. Fishing is impossible for there are no fish — boating, as a pleasure, is destroyed, the banks of the river no longer yield enjoyment. The comfort and enjoyment of the people living along such a stream are impaired and sometimes totally destroyed. We are all agreed that such conditions should not continue to obtain. The policy of the Department remains as announced at Albany two years ago; that the continued pollution of our waters must cease. It does not expect this pollution will cease in a day nor in a year, but it does expect that within a comparatively short period it will be entirely stopped. When a given case of water pollution presents itself for consideration two questions arise which must be definitely answered before advance can be made. The first question is, what is the best and wisest thing to do in order to correct the existing conditions? And the second question is, how is it to be done? The first question the Department will always try to intelligently and comprehensively answer. To know what to do is perhaps the most important part in purifying our waters, and the Department feels it is a clear duty to furnish that information, if possible.

The answer to the second question will, it is hoped, correct a great amount of misapprehension as to the powers and duties of the State Health Department under the existing law. It is evidently not the present intention of the State to remove from localities, or the individual citizens inhabiting such localities, certain duties and responsibilities relating to health matters. Their powers begin, in most instances, where those of the Com-

missioner of Health end, and under the terms of the present health laws the reply to the second question must be: It must be done by the town or individual affected. In other words, in the majority of cases when the Department is appealed to for relief from water pollution or abatement of nuisances the Department may point out through its experts the proper way to correct these evils, but the town or individual must do the rest. If the town above on the stream is polluting the water seriously, the town below must take the active and legal steps, in the majority of cases, to have the nuisance abated. The Department may investigate, declare the existing conditions an intolerable nuisance, and report its conclusions, including the remedy for the evil, to both towns. But, in the majority of cases, that is as far as it can now go. The responsibility rests where it ought to rest in many cases, on the shoulders of the local authorities, who are much too willing very often to shirk their plain duty. It is as much the duty of health boards to enforce the health laws of this State as it is that of the Commissioner of Health, and the local authorities of the towns of this State should shoulder their responsibilities and not attempt to place them elsewhere. The Department has no arbitrary powers in the matter of stream pollution. It cannot, in the majority of cases, directly order a town to take its sewage out of a stream, or direct it peremptorily to construct a sewage disposal plant. It can, of course, through the Attorney-General, appeal to the courts, but so can the towns and individuals in the majority of cases, and it is the intention of the law as it stands that they shall do so. I am not discussing the value or effectiveness of the present health laws. I am simply trying to make clear their practical working. In a number of cases the Department has no doubt been deemed very indifferent and ineffectual when it has done all the law permitted and stopped only because the limitations of the law compelled it to.

Tuberculosis

That tuberculosis was both communicable and preventable was as well known to sanitarians twenty years ago as it is to-day.

And it may be taken as a most striking illustration of the slowness with which knowledge filters down from the laboratory and the school to the profession and the public, that not until comparatively recently has such a realization of conditions obtained as to cause an imperative demand for the enforcement of

preventive measures. It may be safely said now, I think, that it is an universally accepted fact that some kind of supervision is necessary, opinions only differing as to the extent of the supervision and the manner of its enforcement.

You will, undoubtedly, agree that there are at present some thousands of our fellow-citizens throughout the State in the early stages of tuberculosis who might, under favorable conditions, be kept among the living. I am not speaking now of advanced cases, who must inevitably be soon numbered with the dead, nor of those incipient cases receiving competent care, but of those who are entitled to treatment which they do not receive. Shall the State that houses, treats, and cares for both the acute and chronic insane refuse to consider the needs of those afflicted with tuberculosis? Are the blind, the crippled, and the epileptic to be given State aid, and the consumptive refused it? And it must not be forgotten the indigent consumptive in any stage of the disease, unlike the wards of the State just mentioned, is a very constant menace and danger to those with whom he is living. If we admit then that the State should take some action the instant question arising is, What action?

It is indeed a most grave and difficult question, and a complete and thoroughly satisfactory answer is perhaps impossible to give at present, nor would I attempt at this Conference to suggest even a tentative policy for our State, were it not for the overshadowing importance of the subject and a clear conviction that some kind of action should be taken as quickly as possible.

You will remember Pennsylvania has an appropriation of $400,000 for the dissemination of information regarding tuberculosis, its prevention and cure. Our Department has in the last supply bill an allowance of $1,000 for the creation of a traveling tuberculosis exhibit. There will be practically no money left when that exhibit is fully completed. But if we go ahead with the courage of our convictions and demonstrate the efficiency of our plans the money to carry on the work will come.

In this campaign then, against tuberculosis, the following steps might be taken.

1. NOTIFICATION AND REGISTRATION

Without notification it is apparent that any real progress is rendered impossible. You cannot give aid to any consumptive until you know where he is, nor can it be known what help he re-

quires until the case is properly reported and the conditions are described. Every physician in the State should promptly notify his health officer of any case of tuberculosis occurring in his practice, using for that purpose the cards and blanks already provided by the Department. The health officer in turn reports all cases to the Department. There is no publicity and all such returns are strictly confidential communications. This step was begun on January 1st of this year, and while the registration of cases has been fairly good, the step is as yet only half taken. To have it entirely satisfactory we must have the active and cordial support of the profession-at-large and more systematic work from some of our health officers.

2. THE ESTABLISHMENT OF DISTRICT STATIONS

The medical officers of the Department have been for some little time so selected that it is now possible to divide the State into districts, each one having within its boundaries at least one medical officer.

At some central point in this district a station may be established in charge of the medical officer and should contain a supply of diphtheria and tetanus antitoxin, a bacteriological outfit, report cards and blanks, and a full supply of all the circulars and pamphlets issued by the Department on tuberculosis. The station would also contain outfits for the collection of sputum in order to facilitate an early and definite diagnosis. The station and its contents would be an educational center. The circulars would be for both physicians and the laity, and their distribution would be made by the medical officers and the health officers in the district. The circulars would be sent to the press and would undoubtedly be published. Addresses by health officers before medical societies and popular audiences, organizations of sanitary societies, the Sanitary Institutes of the Department, and the use in larger towns of our tuberculosis exhibit would all prove powerful and effectual factors in the fight against the Great White Plague. In this campaign of education the Department will endeavor, acting with the health officers, health boards, and public-spirited citizens, to organize anti-tuberculosis societies whose local influence and aid would be invaluable. For it must be steadily borne in mind that the greatest single factor in the winning of this battle is the constant and persistent dissemination of practical knowledge of the disease, its

dangers and how to successfully combat it. You have doubtless noted that the proposed stations serve not only as centers from which tuberculosis may be fought, but also as points where the antitoxin of the State Laboratory may be obtained and, in some cases at least, bacteriological examinations made. The necessity for the promptest possible distribution of antitoxin is obvious and needs no comment. It may be said, however, that the high cost of commercial antitoxin seriously interferes with the sanitary control of diphtheria among the better classes. Diphtheria which now stands fifth among diseases as a cause of mortality with 3,167 deaths yearly, will continue to maintain this position until sanitary authorities and the profession-at-large are as free to use it without restrictions as they now are to use ipecac or nux vomica.

In its bacteriological work the State Laboratory labors under these two disadvantages, namely: Physical inability to make speedy reports and lack of contact with the physician and health officer.

To obviate as far as possible the first difficulty, I have recently issued a notice to the effect that the reports upon the primary cultures from suspected cases of diphtheria and upon the Widal tests for typhoid fever be made by telegraph at the Department's expense. This will effect a saving in some instances of twenty-four hours in placing these reports in your hands, and will relieve health officers from the burden of paying for such services out of their own pockets as has heretofore been too often the case. It is not unlikely that a further saving in time can be obtained in the future by the improvement in the details of the transportation of specimens, such as, for example, a provision for the incubation of cultures while en route.

To obviate the second difficulty, to a slight extent at least, I have had prepared a traveling bacteriological laboratory which will be sent with a trained laboratory diagnostician to those communities in which problems specially difficult of solution arise in connection with these diseases. Already the State Laboratory has conducted one such field of investigation in an extended and uncontrollable outbreak of mild diphtheria with, I believe, excellent results.

But these provisions do not entirely overcome the difficulties or make the State routine bacteriological work the ideal method for the diagnosis of suspected diseases in the rural districts.

The local laboratory will always have its superior opportunities for the purely routine work. A movement has been started in this State by one of our most progressive health officers and his col-

leagues, and has resulted in the foundation of the Ontario County Laboratory at Canandaigua. The Legislature passed a bill permitting the county authorities to pay the salary of a county bacteriologist. The building and equipment for the work was generously donated by a public-spiriteed woman, and the small fees obtained for the examinations of a private character which are made pay at present for the incidental running expenses.

A plan of co-operation between this County Laboratory and the State Hygienic Laboratory has been arranged by the directors of both institutions. Assistance is given by the State Laboratory in connection with those technical procedures where operation in bulk tends toward economy. On the other hand, the County Laboratory reports all the positive results of the examination of cultures, sputum and Widal tests to the State Laboratory. It would seem most desirable that this plan be introduced in other sections of the State.

Whenever such a laboratory is established, the State Department will be prepared to make it a station of the Department as outlined above, supplying a certain amount of apparatus, and aiding its efficient operation in every possible manner. I am of the opinion, however, in the development of this new work that provision should be made not only for a permissive co-operation between the County and State Laboratories, but that the County Laboratory should be introduced into the public health service on somewhat the same legal basis as now applies to the relation between the local and the State health departments.

To this end I believe a bill should be introduced into the Legislature during the coming session, permitting the establishment of hygienic laboratories by counties or groups of counties, and for a proper relation to the State Hygienic Laboratory and the State Department of Health.

It will be seen at once, what added strength the establishment of laboratory stations would bring in the fight against tuberculosis.

3. STATE CAMPS FOR CONSUMPTIVES

And now what care should the State give to the thousands of cases of incipient tuberculosis needing help?

If any care is to be exercised, it is plain that it must be as simple and inexpensive as possible; otherwise the cost of caring for those people would be prohibitive. But we must always

remember that we pay for them anyway. Whether we provide proper care or send them to almshouses and charity hospitals and thence to Potter's field, the expense is always ours. Remember also that every case removed to a suitable environment ceases to be a source of infection to his family, to his neighbors and the people in the streets.

I would advocate, therefore, the establishment of State camps for consumptives on State land. Plain board cabins should be erected, fashioned after sanitary plans. A little simple furniture should be provided. The inmates should be required to furnish, when able, all other furniture necessary. Such camps should have a resident physician and patients admitted only after proper and competent examination.

The results attained by such camps in other States and indeed in our own, have been most surprisingly gratifying and the percentage of cases cannot be exceeded. I do not forget the very admirable Raybrook Hospital and the fine results reached there, but the State cannot, it seems to me, commend itself to the policy of erecting such expensive buildings and demanding large allowances for maintenance. The number of consumptives seems to be too great to carry out such a plan, admirable though it may be.

I believe that State camps instituted somewhat as outlined would produce the maximum of results at the minimum of expense.

4. LOCAL HOSPITALS

There still remain for our consideration the chronic, the hopeless cases of tuberculosis. What shall be done with them? Should the State go as far as I have suggested, it would very probably deem it well to stop there, at least for the present.

Nor ought the State to do all of this work. The cities and towns of this State have responsibilities and duties which they too must recognize. It must be their part to care for the chronic cases of tuberculosis. Just how this should be done is a matter for determination by the local authorities. There is no time here to enter upon a discussion of methods.

Some such policy as the one I have tried to explain to you should be at once adopted by New York. I have only been able to present the bare outlines and many important matters have not even been alluded to. All that has been planned could not, of course, be done at once even if funds were available. But even with the little we have, we can begin this work and if nothing

prevents I propose to make the first move on the 1st of January, 1908.

The Public Service

He succeeds best who serves best. For success is service and the greatest hero is the greatest helper. The difference that existed between the noblest emperor of the Romans and the meanest royal profligate who ever occupied a throne is precisely the difference that obtains between great men and little men the world over. The one would advance the world; the other would advance himself. One would serve; the other would be served. The monuments made by printer's ink are but paper shafts that stand but for a moment; but he who writes himself upon the hearts of his fellow men has made an epitaph that shall endure for generations.

With every true man his work is first, his fee second — very important indeed, but still second. But in every walk in life there is a class ill-educated, cowardly, stupid. And with these, just as certainly, the fee is first and the work second, as with the noble the work is first and the fee second. And this is no small distinction. It is, as Ruskin says, the whole distinction in a man; distinction between life and death *in* man, between heaven and hell *for* man. "Society," said Burke, in his "Reflections on the Revolution in France," "Society is indeed a contract. It is a partnership in all science; a partnership in all art; a partnership in every virtue and in all perfection. As the ends of such a partnership cannot be obtained in many generations, it becomes a partnership not only between those who are living, but between those who are living, those who are dead, and those who are to be born." With but slight changes in phraseology this beautiful and impressive statement applies with great exactness to our organization. It is for us, with great opportunities for efficient service before us, to bear this partnership into which we have entered constantly in mind. It lies with us to illustrate the meanness of an education which produces learned shirks or selfish skulkers, or to illumine the perfection of a rounded culture with the radiant light of devotion to humanity. If difficult problems confront us so much greater becomes the opportunity to solve them. If great obstacles are in the way the greater glory to remove them. The watchword is service. This it is that crystallizes our belief that enthusiasm and faith are the precursors of great deeds. As Dr. Van Dyke says, it im-

pressively embodies our conception that the greatest success for a man, the only one at command, is to bring to his work a mighty heart. For it is more man that we need. Recent developments and discussion have driven us back upon the old, old truth — that only personality is the solution for the times — that all of the world's needs are embodied in its need for manhood.

About the plain and clear duties before us to perform we should have settled and fixed convictions. A man without convictions is a man of blubber. I do not say beliefs, opinions, views — all these are chaff in comparison. I say convictions so intertwined with his whole intellectual being, so coloring every thought, plan, purpose, labor, that they can no more be separated from them than his own existence can be separated from them. They should be seen and felt as powers wherever he goes; not because he is sounding a trumpet before him proclaiming their presence, announcing their glory, but because they are an inseparable part of his own personal character as the sun's brightness is of the sun's. So shall we labor that what come to us as seed shall go to the next generation as blossom and that which come to us as blossom may go to them as fruit.

But in this fight in which we are justly engaged, the Empire State sends to us her message:

Have you heard it?

"On the night of July 2, 1863, after a bloody battle a council of war was convened by the commanding general. The corps commanders present expressed their views. Slocum, being the ranking officer in the council, was the last to reply. He said, 'Stay and fight it out.' Slocum was not an orator, but no orator made a better speech. It was brief like Cæsar's *veni, vidi, vici,* but it told the whole story. Stay and fight it out was the advice given by the council to General Meade, who was not satisfied with his position at Gettysburg. The army of the Potomac did stay and fight it out and the victory gained is the last comment that can be made."

That is the message of the Empire State — "Stay and fight it out." And on the unsullied surface of the scroll that shall record our advance during the coming year, first of all let us write across it in living letters of light the motto of this Conference —

"Stay and Fight it Out."

WEDNESDAY, OCTOBER 16, 1907

SECOND SESSION, 8 P.M.

THE DISSEMINATION AND CONTROL OF TUBERCULOSIS AS ILLUSTRATED IN THE BOVINE SPECIES

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There is perhaps no other subject related to public health that has given rise to such animated discussions, or to the expression of so many divergent views, as the one of tuberculosis. I need not point to the 5,000,000 victims it annually claims in all countries, or to the 13,000 or more human lives that the Empire State contributes to it each year, to show cause for this intense, widespread interest in it. You all know that there is no other disease which inflicts such deep wounds on mankind.

Although tuberculosis is one of the oldest diseases of which we have knowledge, its true nature was not revealed until its infectiousness was demonstrated by Villemin in 1865 and its specific cause discovered by Koch in 1882. It is from the latter date that real progress in its study began. With the incoming of its specific etiology there began a rapid outgoing of innumerable traditions concerning it. By the aid of its specific cause more has been learned about the disease itself and how to combat it during the last twenty-five years than the total efforts of the past centuries brought to us. This is important, for such rapid evolution of facts and methods are not compatible with the habits of human thought which have been handed down to us through generations. I mention this as a possible, if not a rational, explanation for the apparently slow progress which we are sometimes told is being made in preventing tuberculosis. We recognize indifference to the best efforts put forth to check its ravages, but we are sometimes slow in detecting the difficulties. We do not always recognize the effect upon the minds and hearts of the people of the sanitary regulations issued pertaining to this disease. Many of

them are incompatible with inherited ideas relative to the proper and humane care and treatment of the sick. More than this, it is difficult for the untrained in this science to recognize the operation of living organisms they cannot see or the necessity of heeding measures to intercept invisible forces. However, sentiment is giving way to reason and knowledge is slowly replacing opinion, and as a result wonderful progress is being made not only in the treatment of tuberculosis, but also in building up a widespread and wholesome public sentiment for its elimination. This is the result of educating the people concerning it. When knowledge that can be comprehended and understood by the laymen is disseminated relative to the parasitic nature of tuberculosis, and the channels of infection are clearly indicated, it should require but a few short generations to make it a matter of history. I believe with Koch, that the war against tuberculosis is a conflict into which we may enter with a well-founded prospect of success. Strictly speaking, the fact that it is a preventable disease ought to have become clear as soon as the tubercle bacillus was discovered. Koch believed it from the beginning, and so will every one who convinces himself that this scourge of humanity rests in a tiny organism which cannot act injuriously to man unless it is allowed to enter his tissues, where it finds a suitable field for growth and operation.

The student of tuberculosis will recognize that in its etiology, development and spread it is one of the most ideal of parasitisms. Its specific organism is one of the highly developed parasitic bacteria. It does not, usually, destroy its host quickly, but slowly. It kills because its growth in the tissues has destroyed organs or parts that are necessary to life. It spreads far and wide because the infected are not immediately seriously ill, but are able to go about spreading the virus, usually in their sputum. Thus we have in our schools, shops, stores and everywhere, those who are slowly but surely yielding to the supremacy of the dreaded tubercle bacilli. From certain of these cases in the beginning and early stages the virus is being disseminated. From the advanced ones which are giving off innumerable tubercle bacteria many more people are becoming infected.

If we inquire into the means of disseminating tuberculosis and methods for its prevention from the etiological point of view we shall find that the problem is not so difficult. The recognition of its specific cause is a tremendous aid in its control. It does

y absolutely with whims, traditions and unfounded opinions. rovides a definite, tangible living object to deal with. To come or check the natural course of a microscopic creation we the intelligence and wisdom vouchsafed to man. To know ife history of the tubercle bacillus, its means of dissemination, the effect of its multiplication upon its host is all the knowl- required. To prevent the spread of tuberculosis necessitates application of this knowledge to avoid the transfer of the s from the infected individual to the healthy one. Its path- y shows the various means of exit of this organism — with the s, urine, discharge from tubercular ulcers and abscesses, milk sputum. These with the channels of entry circumscribe the ns of dissemination. With the intervention of agents of ruction for the tubercle bacteria as they leave the infected ion, or the separation of the infected from the healthy, cuts completely the natural ability of the disease to spread. The le problem of the control of tuberculosis consists simply in y diagnosis and the proper isolation or care of the patients.

t has so happened that the bovine species upon which man ends so largely for food is subject to a like parasitism. Bovine rculosis is to cattle what human tuberculosis is to mankind. the conditions to be overcome in its elimination from cattle mankind are practically the same, save for the sacredness of life of the human patient, it seemed that a discussion of status of bovine tuberculosis, especially its means of dis- ination and methods of control, might be of interest.

t was originally believed that the germs producing tuberculosis ll mammals were indentical. More recent investigations by th, Koch and many others, have shown that there are differ- s — morphologically, culturally and in their virulence — een the bacilli of human and bovine disease. The fact re- ls, however, that the literature contains about fifty cases in h the bovine type of tubercle bacilli have been found in nts and children. Some cases were fatal, others not. In tion to this there are several cases reported by direct, acci- al, inoculation from cattle to man. The interim reports of Royal Commission point out the frequency with which rcle bacteria virulent for animals are obtained from human cts. Dr. Theobald Smith has recently stated in a very in- tive article on the channels of infection in tuberculosis, "I are the statement that probably not more than 1 per cent. of all

cases will show bovine bacilli, and that in individuals over twelve years, they will be found only very rarely." However, these findings are sufficient to warrant the continuance of every reasonable effort to eliminate the disease from cattle. We do not want the milk from tuberculous cows.

Historically, bovine tuberculosis seems to have developed in Eastern Africa and Western Asia. From these centers it spread during the centuries to nearly every cattle-raising country of the world. At first its dissemination was slow, but during the last fifty years it has spread at a very rapid rate because of the great increase in cattle traffic. It is stated that in many countries, and in large areas within others, it did not exist until it was introduced within very recent years by the importation of tuberculous animals.

The dissemination of bovine tuberculosis is traced largely to, (1) the introduction of tuberculous cattle in the herd, and (2) by infecting the calves with separated milk from creameries where the milk from tuberculous cows is received. When once introduced it spreads in the herd by contact — licking each other's noses, drinking from the same watering trough, eating from the same manger — and the healthy calves drinking the milk of diseased cows. The avoidance of the purchase of infected cattle is very important. It often happens at both private and auction sales that infected animals are purchased and placed in healthy herds, thus sowing the seed of destruction. Russell* has pointed out a specific case in which an auction sale caused tuberculosis to be introduced into twelve previously uninfected dairies. The demands of cities for large quanties of fresh milk in winter is causing the dairymen to sell the dry and purchase fresh cows, thus enhancing the spread of the disease. In many local dairy districts it has been brought with the separated milk for feeding calves from creameries where milk from tuberculous cattle is received.

The amount of tuberculosis found in our food animals by the Federal veterinary inspectors is enormous. During the fiscal year 1905, there were inspected 6,134,388 carcasses of beef animals, of which 10,956 were condemned for this disease. The increase of tuberculosis in hogs is shown by the fact that in 1900 of 23,336,884 hogs that were inspected, 5,440 were affected sufficiently to cause a condemnation of some one or more parts of the carcass. In 1905, of 25,357,425 hogs inspected post-mortem,

* Bulletin No. 114, Wisconsin Agric. Exp. Station, Madison, Wis., 1904.

4,919 carcasses and 142,105 parts of carcasses were condemned r tuberculosis. It should be remembered that these condemnaons were made on the inspection of hardly a third of the animals lled annually in the United States for human food. It is also nportant to note that these inspections were made on animals illed in our large packing-houses, and which were raised under ie most favorable conditions existing in our country.

The extent and rapid increase of bovine tuberculosis in various ther countries during recent years has caused alarm, both beause of its effects in reducing the general food supply and its upposed danger to human health. The appended statistics taken from Bulletin No. 53 of the Bureau of Animal Industry are significant.

"The slaughter-house statistics of Prussia show 14.6 per cent. of the cattle and 2.14 per cent. of the hogs to be tuberculous. In Saxony the percentage is 29.13 for cattle and 3.10 for hogs. In the city of Leipzig, the figures are 36.4 per cent. for cattle and 4.17 per cent. for hogs (Siedamgrotzky). Of 20,850 animals n Belgium tested with tuberculin in 1896, 48.88 per cent. reacted Stubbe.) Of 25,439 tested in Denmark from 1893 to 1895, .3 per cent. reacted; and of 67,263 tested from 1896 to 1898, .8 per cent. reacted (Bang). An examination of 20,930 cattle Great Britain, either slaughtered and examined post-mortem tested with tuberculin, showed 5,441, or 26 per cent. affected h tuberculosis. McFadyean estimates that 30 per cent. of the rs in Great Britain are tuberculous."

The report of the Minnesota Live Stock Sanitary Board for year ending July 31, 1906, states that swine tuberculosis is the increase and that it is now safe to assume that it causes annual loss of $70,000 to the State, through condemnation by Federal meat inspection. I emphasize the increased amount tuberculosis in swine, because it explains better than any ier facts we have, the extent and rapidity of the spread of the ease from infected cattle. Tuberculous hogs come from dairy tricts where they are fed the separated milk from creameries allowed to run after the cattle while the latter are being fatted for the market.

The results of the various examinations and experiments relave to tubercle bacteria in milk show that about 2 per cent. of berculous cows have the disease localized in the udder. These imals are constantly giving off large numbers of tubercle bacria in their milk, and the consumption of such milk would be

exposing the consumer to great danger of infection. Of all tuberculous cattle in which the udder is not diseased, about 15 per cent. are found to give off tubercle bacteria in their milk at some time during the course of the disease. In these cases the milk is not constantly infected, but it is impossible to know when it may be so. The milk at any given time from this large percentage of tuberculous cows may or may not contain the dreaded organisms.

From the results of experiments conducted in the laboratory of the Bureau of Animal Industry, as well as from the majority of similar investigations, Mohler drew the following conclusions regarding the infectiousness of milk from tuberculous cows:

1. "The tubercle bacillus may be demonstrated in milk from tuberculous cows when the udders show no perceptible evidence of disease, either macroscopically or microscopically.

2. "The bacillus of tuberculosis may be excreted from such an udder in sufficient numbers to produce infection in experimental animals both by ingestion and inoculation.

3. "That in cows suffering from tuberculosis the udder may, therefore, become affected at any moment.

4. "The presence of the tubercle bacillus in the milk of tuberculous cows is not constant, but varies from day to day.

5. "Cows secreting virulent milk may be affected with tuberculosis to a degree that can be detected only by the tuberculin test.

6. "The physical examination or general appearance of the animal cannot foretell the infectiveness of the milk.

7. "The milk of all cows which have reacted to the tuberculin test should be considered as suspicious, and should be subjected to sterilization before using.

8. "Still better, tuberculous cows should not be used for general dairy purposes."

In order to appreciate the reason for the uncertainty of the presence of tubercle bacilli in the milk of tuberculous cattle, one must understand the pathology of the disease. In the bovine species the lesions are very liable to be localized in some gland or glands where they remain for a variable time, often through life, without becoming generalized. So long as the tubercle bacilli remain in these localized lesions, they do not appear in the milk.

The facts already set forth show that in the elimination of bovine tuberculosis there are difficulties not only from the sanitary side, but also from its great economic significance. The problem

resolves itself into an inquiry into the best methods to follow under two distinctly different conditions, namely, (1) when the herd is free from tuberculosis and (2) when a greater or less number of animals are already affected. The same condition exists in the human species.

In preventing the entrance of a specific disease, it is simply necessary to keep out the microbe that produces it. The all-important question to consider in this connection is, how to keep it out. I have already mentioned the two most common channels through which tubercle bacteria gain entrance to a herd of uninfected cattle, namely, through the feeding of calves with the unsterilized milk from tuberculous cows and the introduction into the herd of tuberculous animals. The prevention by cutting off these channels of infection is not difficult nor expensive compared with the elimination of the disease if introduced or the loss it will occasion if it is allowed to remain.

To protect from the first it is simply necessary to sterilize the milk fed to calves unless it is known that the animals from which it came are free from this disease.

To remove the second danger, it is necessary to have the animals carefully examined and tested with tuberculin before bringing them into the herd. The tuberculin should be applied by a person competent to interpret* the results of the test and to see that all of the necessary conditions are complied with.

The Vaccination Method.— Since the discovery of tuberculin there has been an almost continuous series of investigations directed toward the production of immunity in cattle against tuberculosis.† Experiments have been made with tuberculin, with

* The interpretation of the temperature record requires care. If, however, all conditions pertaining to the protection of the animal have been fulfilled, the temperature curve mentioned is a very sure indication that the animal is suffering from an active, although it may be a very small, tubercular growth. If there is no reaction the correct interpretation is more difficult. In this case there are three conditions which must be taken into account, namely: (1) If the animal is extensively diseased it may not react. (2) If the test was made during the period of incubation there would be no reaction, although the disease may soon develop. (3) It is known that cows which have reacted may, because of the arrest of the disease, fail to react subsequently but later the disease would start up again, when the animal would react. We have records of several cases of this kind. Great care must be exercised, therefore, in the interpretation of negative results, especially in tests in herds where tuberculosis exists and where it is possible that the animals failing to react have been infected.

† For a full discussion on immunization against tuberculosis see an article on "Immunization of Animals against Tuberculosis," by Dr. Leonard Pearson. second annual report of the Henry Phipps Institute for the Study, Treatment and Prevention of Tuberculosis, Philadelphia, 1905.

the new tuberculin of Koch, with serums of various kinds, and with dead tubercle bacteria. The most energetic efforts have been made in the production of a vaccine, consisting of attenuated tubercle bacteria from cattle, or man, or of the avian variety. Space will not permit of a discussion of the experimental work, but suffice it to say the results thus far are not very satisfactory.

Pearson has succeeded in immunizing cattle against tuberculosis, but as yet the method is not practicable, although he feels that it may become so.

The bovovaccine of von Behring is still in the experimental stage. Many calves have died of pulmonary embolism and the development of tubercular lesions have occurred following its use. There are, however, a few reports of satisfactory results. The method proposes to immunize cattle for several years at least, and consequently reports that cover experiments of only a few months' duration or a year at the most do not carry conviction as to the efficiency of the method.

Von Behring* has more recently spoken encouragingly of bovovaccine or the Jennerization method and also the new product known as tulose which he has obtained from tubercle bacteria. With this he has succeeded in immunizing against living tubercle organisms. This method is known as Mithridatization. He also feels that a passive immunity may be obtained by the use of serums.

While we hope that the experiments will prove successful and great assistance will come from vaccination in the fight against tuberculosis, we cannot look to it for assistance for our immediate needs. The biological principles underlying the processes of immunity are not especially encouraging for the disease in cattle. As vaccinations have for their purpose the immunization of healthy animals, it seems more logical to protect the herds against infection, and thereby avoid any necessity for increasing resistance. The value of the vaccination method, if successful, lies in the immunization of the calves in tuberculous herds, thereby making it possible to build up a sound herd from tuberculous stock.

The Handling of a Tuberculous Herd.— Where the cattle are free from tuberculosis, the method of prevention is simple and inexpensive. But where the disease already exists in a dairy, to a greater or less extent, the problem is far more trying. It is

* British Medical Journal, September 8, 1906, p. 577.

r that a dairyman cannot afford to have tuberculous cattle,
it is a fact that many of them possess such herds. The ques-
, therefore, is, how can a man who has tuberculous animals
ıinate the disease with the least loss? Two methods have
ı proposed and tried, namely, the immediate eradication by
ghter of all diseased animals and, secondly, the application of
Bang method.

he eradication of the disease by destroying all infected ani-
ı was the first proposed and extensively tried. It was based
ı the great sanitary significance of the disease rather than
ı the disease as a destroyer of cattle. It anticipated State
for payment for the condemned animals. It failed because the
ase was found to be so widespread that appropriations to carry
the method could not be secured from the Legislatures. As
ied out, the method also failed of permanent good because
id not provide for retesting the remaining animals and thus
ing and eliminating the infected individuals in which the
ase was in the period of incubation at the time of the first
and slaughter. More than this, it called for an unwarranted
ruction of property in cases where fat animals that proved
ə very slightly infected were destroyed.

he Bang method for handling tuberculosis is simply the pro-
ıre recommended and carried into effect in Denmark by Prof.
g of the Copenhagen Veterinary College.*

he object of this method is to replenish a tuberculous herd
as little loss as possible. It requires that all animals which
r physical symptoms of the disease shall be destroyed. Those
:h give a tuberculin reaction but which, on physical examina-
, exhibit no evidence of their being tuberculous are isolated.
y are kept for breeding purposes. The reacting animals are
fully watched and if any of them develop obvious symptoms
ıe disease they are slaughtered. The stables from which the
ısed animals are removed are thoroughly disinfected.

s the sound herd is built up, the isolated cattle may be fat-
l and killed, under proper inspection, for beef. The laws
early, if not all, countries permit the use of meat of tuber-
us animals for food when the disease is localized. In this

*ang, B. The struggle with tuberculosis in Denmark. The Veterinarian, LXVII, 1895, p. 688. Tuberculosis of cattle. Penn. Dept. of Agric., ndix Bull. 75, 1901.

way the people of Denmark have been able to greatly reduce the very high percentage of tuberculous cattle and at the same time minimize the loss they formerly sustained by the frequent deaths of diseased animals.

The Bang method, modified to suit the local conditions, has been applied with great success in Hungary, where the reports show that many highly infected herds have been freed of the disease in from four to six years. In Norway and Sweden the results have been equally good. Prof. Regner* states that the percentage of reacting animals among 36,149 cattle was, at the beginning of the application of this method, 33.6 per cent. After a period of from two to nine years, in different herds, it has been reduced to 4.7 per cent.

Among the first, if not the first, to put the Bang method to a test in this country was the Wisconsin Agricultural Experiment Station.† They begun in January, 1896, with sixteen reacting animals and eighteen healthy cattle. In February, 1899, they had twenty-seven healthy animals, all the progeny of the group of tuberculous cattle. Russell pointed out at the time that the method afforded a practical and often a most desirable way to replace a tuberculous herd. The method has been successfully applied at the Geneva Experiment Station.‡ October, 1901, the test of the herd showed thirteen healthy and seventeen tuberculous animals. They were separated and the method carried out. The station suffered a loss of four healthy animals in a fire, and a small number of heifer calves were born; but with all the disadvantages, in December, 1905, the herd numbered thirty sound animals and six tuberculous ones. The latter were slaughtered. Of the six, three would have passed the Federal inspection and their beef value obtained had they been disposed of in that manner.

The method is being applied most successfully by a number of cattle owners in this State. I personally know where it is being followed in herds aggregating more than a thousand animals. These infected dairies are gradually, and in some instances rapidly, becoming free from the disease.

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* Regner, Gustav. The suppression of tuberculosis among domesticated animals. Eighth International Veterinary Congress, Budapest, Sept., 1905.

† Russel, H. L. The history of a tuberculous herd of cows. Wis. Agric. Exp. Sta., Bull. 78, 1899.

‡ H. A. Harding, Geo. A. Smith and V. A. Moore. The Bang method of controlling tuberculosis, with an illustration of its application. Bull. No. 277, N. Y. Agric. Exp. Sta., Geneva, N. Y., 1896.

THE STATUS OF BOVINE TUBERCULOSIS IN NEW YORK STATE

Although facts about tuberculosis are generally interesting, I feel that we are called upon to consider more definite and concrete sections of the subject. As health officers of the Empire State, what is the condition respecting tuberculosis of the dairies furnishing milk to your citizens and of the cattle and hogs providing the home killed beef and pork?

Unfortunately there are no reliable data sufficient to estimate the extent of bovine tuberculosis in this State. The secretary of the former Tuberculosis Commission of the State Board of Health, estimated that about 4 per cent. of the cattle were affected. Of 1,459 animals examined and tested with tuberculin by the State Department of Agriculture up to 1906, Dr. Kelly tells me that 641 or 43.9 per cent. reacted. These herds, however, were all under suspicion and consequently this high percentage of reacting animals could not be considered as representing the condition of the herds generally.

In order to obtain further data on the subject, I addressed a letter to a large number of practicing veterinarians* asking for definite information on this subject. In response I have received a large number of positive statements from practitioners relative to the herds which they have tested in their practice within a period of three years or less. The greater number were made during the last year. In addition to this, the Chief Veterinarian of the Department of Agriculture has kindly furnished me with a list of the official tests that have been made during the last three years, 1904–1906. These two groups of statistics are interesting, because the official tests have been made under the operation of the law in herds under suspicion, while many of the private ones were made where the disease was not suspected by the owner, but because it was required by the purchaser of animals or of milk and its products. It is true, nevertheless, that many of the private tests were made because of the suspicion of the owner or at the suggestion of the veterinarian.

From the total of the individual reports, I have arranged the facts in the appended table (Table I) by counties which gives,

* I desire to express my appreciation and thanks to these veterinarians for their prompt replies and the valuable information they contained. It should be stated that many of the veterinary practitioners of this State are doing pioneer work of great value in trying to teach the farmers the necessity for good results of eliminating tuberculosis from their herds.

in addition to the number of animals tested, some idea of the distribution of the herds from which the data were obtained.

In Table II will be found the facts similarly arranged of the official tests of the State, kindly furnished me by the chief veterinarian.

TABLE I.—A TABLE GIVING THE RESULTS BY COUNTIES OF TUBERCULIN TESTS MADE BY VETERINARY PRACTITIONERS. 1905–1907.

COUNTY.	Number of herds tested.	Total number of animals.	Number of animals that reacted.	Number of tuberculous herds.	Number of herds free from tuberculosis.
Allegany	11	169	2	1	10
Broome	1	34	10	1	0
Cattaraugus	14	227	21	9	5
Cayuga	4	44	13	3	1
Chautauqua	11	429	46	10	1
Chemung	17	241	82	14	3
Chenango	15	174	44	11	4
Cortland	10	192	54	8	2
Delaware	26	1,030	553	23	3
Dutchess	21	629	287	18	3
Erie	17	817	340	13	4
Fulton	3	74	8	3	0
Genesee	1	12	3	1	0
Herkimer	4	90	65	4	0
Jefferson	4	63	30	3	1
Lewis	2	45	18	2	0
Livingston	5	155	20	3	2
Madison	6	62	21	4	2
Monroe	6	80	11	4	2
Nassau	1	15	5	1	0
Niagara	2	16	4	2	0
Oneida	5	73	36	5	0
Onondaga	1	18	14	1	0
Ontario	3	134	80	2	1
Orleans	3	9	0	0	3
Oswego	8	169	56	6	2
Putnam	4	46	29	3	1
Rockland	16	231	50	11	5
St. Lawrence	13	266	124	13	0
Schoharie	4	68	26	3	1
Seneca	5	228	64	1	4
Steuben	16	140	16	6	10
Tioga	17	334	35	15	2
Tompkins	24	306	13	6	18
Washington	1	84	5	1	0
Wayne	6	52	16	5	1
Westchester	28	1,242	673	24	4
Wyoming	16	250	39	13	3
Totals	364	8,640	3,111	265	99

A study of this table will show that tuberculosis is widely distributed in New York, and that there is considerable activity regarding it. The results of these private tests are most interesting. Of the 8,640 animals tested, 3,111 or 36 per cent. reacted. Of the 364 herds tested, 265 or 72.8 per cent. were infected, leaving but 27.2 per cent. of the herds examined free from this disease.

—A TABLE GIVING THE RESULTS BY COUNTIES OF ULIN TESTS MADE BY THE COMMISSIONER OF AGRICUL-)04–1906.

NTY.	Number of herds tested.	Total number of animals.	Number of animals that reacted.	Number of tuber-culous herds.	Number of herds free from tuber-culosis.
.....	1	5	0	0	1
.....	7	68	2	2	5
.....	5	44	6	1	4
.....	9	123	10	4	5
.....	2	20	7	1	1
.....	14	59	5	5	9
.....	9	72	6	5	4
.....	9	110	25	5	4
.....	15	140	44	5	10
.....	7	75	25	3	4
.....	6	186	9	2	4
.....	2	38	24	1	1
.....	5	341	8	2	3
.....	5	48	5	2	3
.....	12	68	6	2	10
.....	1	3	0	0	1
.....	2	16	3	1	1
.....	3	54	7	3	0
.....	7	37	18	4	3
.....	7	119	36	3	4
.....	1	14	1	1	0
.....	1	5	2	1	0
.....	3	47	26	1	2
.....	2	12	0	0	2
.....	1	2	0	0	1
.....	2	81	3	1	1
.....	2	4	0	0	2
.....	4	43	18	2	2
.....	1	1	0	0	1
.....	8	65	25	5	3
.....	1	12	0	0	1
.....	7	96	39	3	4
.....	12	163	57	8	4
.....	10	103	17	5	5
.....	2	9	0	0	2
.....	31	378	161	21	10
.....	2	23	0	0	2
.....	2	6	2	2	0
.....	1	1	0	0	1
.....	3	15	0	0	3
.....	9	52	7	2	7
.....	2	4	2	2	0
.....	2	4	3	2	0
.....	4	34	7	3	1
.....	5	52	1	1	4
.....	1	45	27	1	0
.....	1	4	0	0	1
.....	3	49	1	1	2
.....	3	22	1	1	2
.....	8	116	27	7	1
.....	262	3,088	673	121	141

of the facts set forth in Table II is very instructive, s that the official tests made on supposedly diseased aled a much smaller percentage of reacting animals, h larger proportion of uninfected herds than was found vate tests. Of the 3,088 animals tested, 673 or 21.79 eacted, and of the 262 herds tested, but 121 or 46.18 ere diseased, leaving 53.82 per cent. uninfected.

If we take the totals of the private and official tests we have positive information concerning the condition existing at the time in 626 herds, including 11,728 animals. Of the 626 herds, 386 or 61.7 per cent. contained tuberculous animals. Of the 11,728 cattle tested, 3,784 or 32.26 per cent. reacted. Of the 11,728 animals, 2,475 were in 240 herds that were free from the disease. The total number of cattle in the 386 herds containing reacting animals was 9,253, of which 3,784 reacted. This gives us 40.89 per cent. of animals infected in the diseased herds. The average size of the diseased herds is 23.9 animals and the average size of the uninfected herds is 10.3 animals.

It is unfortunate that more knowledge on this subject is not available. The data already given show that it is widespread. Although the figures point to a very high percentage of infection in the herds examined, the fact must not be overlooked, that the total number of animals tested and herein considered represents but a little more than one-half of 1 per cent. of the cattle in the State. It is clear that general deductions should not be made from the condition found in such a relatively small number of animals, but the inference is justifiable that the dairy herds are quite generally more or less seriously infected.

What is being done with the reacting animals in private tests is not known, but casual inspection of a few slaughter-houses during the killing hours show that not a small number of them find their way to the shambles. A few dairymen are resorting to the Bang method to restore their herds. In some localities the local regulations of the Board of Health forbid the sale of the flesh for food of tuberculous animals regardless of the extent of the lesions. In others no action has been taken and the butchers throw away as much meat for disease as their consciences direct. There is a painful lack of uniformity or system observed by the health authorities in the State for the purpose of controlling this disease in the animals furnishing milk and the locally dressed meat.

With the present Federal meat inspection of carcasses for interstate trade, it is very desirable to have a State meat inspection service established for animals killed within the State. This is necessary at present, if the public is to be safeguarded against meat from advanced cases of tuberculosis. Pennsylvania has recently established such a service, administered under the authority of the State Live Stock Sanitary Board. It provides for ten inspectors, and veterinarians have been appointed. These men

can inspect the slaughter-houses, and be present when animals known to have reacted to tuberculin are to be killed. The mere knowledge that an official inspector is liable to visit a slaughter-house at any time with authority to seize any and all diseased or unwholesome meat, has a most beneficial effect upon the butcher.

The necessity of such a service in this State is very evident. A campaign against bovine tuberculosis, which is already beginning, demands an equitable disposition of the reacting and rejected animals. As large numbers of them are suffering with localized and very slight lesions, it is very proper that they be retained for food. It is just as desirable that the cases of advanced and generalized tuberculosis be excluded from our meat markets. It is not entirely satisfactory to leave the decision to the untrained butcher, who is usually financially interested in the carcasses.

With the 1,826,000 milch cows, and 944,000 other cattle in the State more or less affected with tuberculosis, many of the unfortunate individuals will be slaughtered for food. Such is being done at present, and as interest in the elimination of tuberculous animals becomes more general, the number of such infected cattle that will come to the butcher's block will undoubtedly be greatly increased. In addition to the question of tuberculosis, there are many other diseases and diseased conditions found in the carcasses of food animals that should be guarded against. A satisfactory meat inspection service calls for municipal slaughter-houses for all cities in order to better care for the business and to reduce the number of inspectors.

The pathological principle involved in the weeding out of tuberculous animals is simply segregation, and the protection of the uninfected. Those that are infected will recover or die, according to their ability to resist. In either case they lose the power of disseminating the virus. What is true for cattle is true with men. Public sentiment must be educated to a realization of the necessity of carrying out the measures for segregating the advanced cases, and of requiring the others to form such habits that they will not expose the healthy. If these measures are by some thought to be inhumane, it would be well for such to learn the " tenderness of cruelty."

Finally, there are practitioners in comparative as well as human medicine who are not willing to apply methods of precision in diagnosis. When tuberculosis can be determined from physical symptoms alone, much harm usually has already been done. The

success of the Bang method rests in the searching diagnostic value of tuberculin. The checking of human infection depends upon early diagnosis. Tuberculosis is a great destroyer of life, and like other injurious things it will disappear when people learn to avoid it.

COMMISSIONER PORTER — We have known for many years that consumption is both preventable and curable, but it is only as of yesterday that we, as a people, have begun a general campaign against the fatal ravages of this plague. One of the most important meetings perhaps that will be held in the coming year will be that of the International Tuberculosis Congress, to be held at Washington. It will, perhaps, be of some interest to you to know what position our State will take at that meeting. And so, with your permission, I will read to you the following letter from Governor Hughes:

State of New York — Executive Chamber,

October 2, 1907.

Hon. EUGENE H. PORTER, *State Commissioner of Health, Albany, N. Y.:*

Dear Sir: — I have been requested by Dr. John S. Fulton, Secretary General of the International Congress on Tuberculosis, which is to be held in Washington, D. C., from September 21 to October 12, 1908, to procure the participation of this State in the movement to prevent the spread of tuberculosis, which is represented by the International Congress.

The importance of this movement cannot be overestimated. It appears from the statement you have furnished me that upwards of 50,000 cases of tuberculosis exist in the State of New York to-day, of which at least 20,000 are outside of the city of New York. It also appears that the annual average mortality in this State from tuberculosis has been for the last ten years 13,441. The work which the State has undertaken for the treatment of incipient pulmonary tuberculosis at the Raybrook Hospital has had most gratifying results; and from the statistics of the hospital it appears that a very large percentage of the cases receiving proper treatment in the early stages are susceptible of cure. Not only humane motives, but economic considerations urge every effort to prevent the spread of this scourge.

In order that the State may be properly represented at the coming International Congress, I ask you, in accordance with Dr. Fulton's request and with the suggestion contained in your letter of recent date, to prepare a suitable State exhibit.

I have also requested the State Department of Agriculture, the Agricultural Experiment Station at Geneva, the State Veter-

inary College at Ithaca, the State College of Agriculture at Ithaca, the State Hospital for Incipient Tuberculosis, the State Department of Education, the State Prison Commission, the State Commission in Lunacy, the State Department of Labor, and the State Department of Charities to designate members of their staffs, so far as may be possible within their respective appropriations, to aid you in the collection of suitable materials for the State exhibit. Copies of the letters sent to these various departments are inclosed herewith for your information.

It is desirable that the municipal divisions of the State, so far as possible, should be represented in the Congress. I request you, therefore, to communicate with local health boards and officers regarding the matter and to invite their co-operation and that of scientific and medical institutions, laboratories and medical societies and other agencies interested in the subject.

Very truly yours,

(Signed) CHARLES E. HUGHES

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One of the most difficult questions is the early diagnosis of consumption. A thing easier to talk about than to do. With his extended experience and great knowledge of this part of the work upon which we are engaged, I could introduce to you no better qualified speaker than Dr. John H. Pryor.

THE EARLY DIAGNOSIS AND TREATMENT OF PULMONARY TUBERCULOSIS

BY JOHN H. PRYOR, M.D.

Trustee of the New York State Hospital for Incipient Pulmonary Tuberculosis, Raybrook, N. Y.

The actual annual prevalence of tuberculosis in this State has not diminished but increased. Consumption continues to cause one-tenth of all deaths. True effective prevention is in its infancy. Little or nothing has been done in this State excepting in New York city. Ultimately the problem of tuberculosis will have to be solved by the health officers. We know that the disease can be detected early and that about 80 per cent. of those afflicted might recover if rational methods of relief were employed. The vast proportion of the upwards of 14,000 deaths from tuberculosis occurring annually in this State occur between the ages of twenty and forty, and this wanton waste of precious lives causes a loss of wealth to the State of about $70,000,000 annually.

The eradication of tuberculosis is not a mere question of germs but involves a sociological reformation. The slogan of "sunlight and fresh air" must be changed to "food, sunlight and fresh air." Eighteen meals of oxygen a minute must be accompanied by three square meals of food a day. If the cost of existing, not living, continues to increase, consumption will be given greater opportunity to attack the underfed.

The early stage of the disease is seldom recognized, yet it means everything to the patient. At the State Hospital for Incipient Cases at Raybrook, nine-tenths of the patients recommended by physicians could not be admitted, because they were too advanced, and to-day there is room for fifty-five more patients out of a total accommodation of 200 beds. Many of these rejected have been under medical treatment for months for bronchitis, catarrh, obstinate cold or something else. The consumptive has long been the dupe of the quack and the patent medicine harpie, effectually aided by a modern enlightened press whose business manager is usually located nearer the earth than the editorial force. The importance of the finding of bacilli in the sputum has been exaggerated. It is rarely one of the early manifestations. Considerable stress should be laid upon the history, heredity and predis-

position of the patient. Hemorrhage as an early symptom is somewhat rare in the Eastern States. A rise of temperature at some time during the twenty-four hours is most frequent reliable symptom. Loss of weight is usually slight and gradual. The importance of cough has been exaggerated. Physical examination of the chest is most important. The commonest location of beginning disease is at the apex and the initial form is apt to be found about one and one-half or two inches from the tip of the lung posteriorly. A positive diagnosis cannot be based upon the tuberculin test.

In treatment the prime requisites are rest for an indefinite time, pure open air and a full diet. A change of climate undoubtedly contributes much toward recovery, but experience has demonstrated that the incipient will recover in a large percentage of cases by proper care in his own State or country.

In this State there are numerous localities, some known and many untried, where excellent results can be obtained. Sanatoria designed for curable cases should be scattered through the State. The model sanitarium for the poor in the future will be the one which costs the least and accommodates the greatest number.

The unquestioned decrease in the death rate from tuberculosis during the last thirty years began before the discovery of the bacillus and the introduction of special direct methods of prevention. The decrease has been relative; that is, in proportion to the population. The actual annual morbidity from tuberculosis in this State has not diminished but increased. Recent tremendous progress in the nature of sanitary reforms has been almost entirely responsible for the reduction in prevalency and mortality. Consumption continues to cause one-tenth to one-eleventh of all deaths and the death rate rises and falls with the general death rate.

A successful crusade against consumption will be measured largely by a diminution in the proportion of deaths due to that cause and this result will depend largely upon two factors. Prevention and saving the lives of those who escaped protection. True effective prevention is in its infancy. Thus far it has been more or less of a delusion. Little or nothing has been done in this State, excepting in New York city. There great activity is displayed in a comprehensive campaign against the greatest scourge of humanity and the results may afford the best test of preventive measures to be found in the world.

Ultimately the problem of tuberculosis will have to be solved by the health officers. They have the power and should assume the responsibility. Only organization, effective plans and continuous, not spasmodic, activity, will win. Anti-tuberculosis societies may agitate and support, but the health officer must take the initiative and insure the enforcement of practical measures. Otherwise, so-called education of the public by those who are always positive, and sometimes accurate, may arouse public sentiment but not secure action. The association which compels the proper authority to perform his full duty is apt to accomplish the most lasting good.

We claim to know the direct and most of the contributing causes of tuberculosis and have declared that it is preventable and unnecessary. We know that the disease can be detected early and that about 80 per cent. of those afflicted might recover if rational methods of relief were employed. There are about 50,000 consumptives in this State and the death returns show an annual loss of life of more than fourteen thousand. The vast proportion of these deaths occur between the ages of twenty and forty when productive power and ability to provide for dependents is at its highest level. Science has not revealed a way of estimating the amount of physical suffering and distress caused by this malady and, therefore, we estimate the wanton waste of precious lives as a loss of wealth to the State of about $70,000,000 annually.

If these facts are true, and we have told the public that they are true, why does the appalling carnival continue and the ghastly disgraceful death rate maintain its yearly record? The time to look for reasons seems to have arrived.

In the first place, we are learning that promises and predictions based upon narrow views have not been fulfilled. Consumption has not been eradicated, and there is nothing to show that it will be in the near future. The problem is stupendous and multiform and must be attacked by broad methods. It does not involve a mere bacteriological question, but a sociological reformation. The slogan of battle "Sunlight and fresh air" will be changed to "Food, sunlight and fresh air." Eighteen meals of oxygen a minute must be accompanied by three square meals of food. The poor cannot live on air and sunlight, and if the cost of existing, not living, continues to increase consumption will be given greater opportunity to attack the underfed. But we can save time

by two confessions. First, the public is not properly protected. Second, the death rate is not diminished as it might be in an enormous proportion by the early recognition of the consumptive and the adoption of well-known measures for relief. The responsibility for failure must fall largely on the physician and the hope of any true progress must depend more upon the education of the medical profession. The task is an unpleasant one but an impartial examination of existing conditions justifies the frank consideration of undeniable facts. The public has been inoculated with phthisiophobia, but there are signs of returning sanity. There has been a deluge of literature and an unrestrained flux of garrulity designed to reveal how much we know about tuberculosis. Now, how much has the knowledge been applied and how much has it helped the consumptive. The consumptive is an anomaly in the practice of medicine, and prolonged neglect has made his woe in a manner unique. He is the only sufferer from any known disease who does not receive the full benefit of medical skill and knowledge, and consequently consumption is the saddest thing in the world.

IMPORTANCE OF EARLY DIAGNOSIS

The diagnosis of incipient disease is the transcendant requisite. It means everything to the patient, and yet the early stage is seldom recognized. Until recent years an excuse existed for failure to detect the invasion of tuberculosis. Little or no provision had been made for the care of the curable cases and it may have seemed useless to promptly find the existence of disease, particularly among the poor. It was assumed that the patient was doomed, and he may have received the last new remedy or he was treated on the appropriately styled expectant plan.

EXPERIENCE AT RAYBROOK

About four years ago this State established a hospital at Raybrook to provide for 200 patients. The opponents of State care for this class prophesied that the demand for relief would be so great that the State would be financially endangered. They insisted that provision for only 200 was a mere flea bite and in that contention they were right. The largest population ever recorded at Raybrook has been 145. There is room to-day for fifty-five more patients. Furthermore, only about 60 per cent. of the inmates can be classified as incipient cases, and consequently

an institution devoted to their exclusive care is less than half filled by those who strictly belong there. Forty per cent. of those accepted on the report of examination made by State examiners are found to be moderately advanced or advanced on admission. Only one-tenth of the applicants for admission could be accepted because nine-tenths of those recommended by physicians were too advanced. The population of all the institutions in the State designed for the treatment of consumption shows that about 1 per cent. enter an institution at the time when the greatest number of apparent recoveries can be expected. After years of strenuous effort on the part of those interested in procuring promising cases for treatment it is found that the combined average for a large number of sanatoria in this country is about 20 per cent. of really favorable patients. The vital importance of early recognition and treatment is strikingly illustrated by the tabulated results obtained at Raybrook for four years. During that time 549 patients were admitted. Of this number 267 were in the incipient state, 145 moderately advanced and 47 advanced.

	Total cases.	Apparently recovered.	Arrested.	Improved	Unimproved	Died, hemorrhage.
Incipient	267	219	37	5	5	1
		82%	13.9%	1.87%	1.87%	
Moderately advanced..	145	32	89	14	10	
		22.05%	61.38%	9.65%	5.9%	
Advanced	47	0	26	11	10	
			53.3%	23.4%	21.27%	

Thus of the incipient cases 82 per cent. apparently recovered and 13.9 per cent. were arrested. Of moderately advanced cases 22.6 per cent. cases apparently recovered and of advanced cases none apparently recovered. It is fair to assume that about 160 patients failed to recover because they were sent to the hospital too late. If there are 50,000 consumptives in this State and the average duration of the disease is about three years, there must be thousands of the afflicted at any given time who are in the early stages of the disease. I appreciate the chances for error in statistics due to personal equation and faulty technique, but imagine what an early diagnosis and vastly increased provision for proper care would mean in the Empire State. Remember, also, that every inmate is sent home with a liberal education. He knows how to take care of himself the best his condition and environment will allow, and he ceases to be a source of any danger to his fellow beings. Every graduate is a teacher of hy-

giene and the gospel of fresh air. The consumptive has a right to insist upon this chance. Why doesn't he demand it? Because he does not know, and generally is not told, that he is a consumptive, until too late.

WHY PULMONARY TUBERCULOSIS IS NOT RECOGNIZED

Why does such an insignificant number receive an opportunity to recover and why is the disease not recognized in time? There is nothing to be gained by quibbling or evading the answer. A large proportion of the medical profession do not, cannot or will not, detect the presence of pulmonary tuberculosis during the incipient stage. There can be no other explanation of certain deplorable conditions and the best remedy lies in the honest admission. It has been claimed that many poor patients do not consult a physician at the right time, and this is sometimes true, but the comparative number is small. With very few exceptions, the unfortunate patients who failed to gain admission at Raybrook had been under the observation of one or more physicians for months, and most of them had been treated for bronchitis, catarrh, an obstinate cold or something else. Furthermore, the experience of physicians at health resorts frequented by the well-to-do reveals a similar tendency to delay sending patients away until evidence of advanced disease is only too plain. An unknown percentage of unfortunates fall into the hands of physicians whose practice is more or less tainted by a growing commercial spirit. An overcrowded profession, the cost of living, a superabundant supply of medical colleges and variegated forms of healing account somewhat for the fact that the sufferer from a long-continued chronic disease is valuable prey. The consumptive has long been the dupe of the quack and the patent medicine harpie, effectually aided by a modern and enlightened press whose business manager is usually located nearer the earth than the editorial force.

REASONS WHY OVERLOOKED

In a search for reasons why beginning tuberculosis disease escapes the notice of the physician the most natural one seems to be that he has not been taught how to find it, and the fault is to be found in the medical school and the text-books. Many physicians have never seen to recognize, or examine an incipent consumptive. Their education was confined to the study of the advanced lesions and the later signs and symptoms.

EXAGGERATED IMPORTANCE OF THE BACILLUS

Probably the greatly exaggerated importance ascribed to the presence of the bacillus in the sputa and the dependence upon this as the only positive evidence has done more than anything else to distract attention from other reliable clinical signs of disease. As a matter of fact the appearance of the bacillus may usually be regarded as a late manifestation. There are instances when its presence may be one of the first indications of certain obscure forms of the disease, but as a rule with few exceptions definite physical signs are evident some time before it can be found. Usually bacilli are not ejected until considerable destruction of tissue has occurred and the lesion and its nature may be very apparent long before that time. Much needless inexcusable delay may thus be caused by waiting for its detection. Cases of closed tuberculosis will escape notice, and large affected areas may progress until an opinion is of little benefit to the patient. Quite frequently a satisfactory diagnosis can be made weeks or months before a search for the bacillus is successful. The belief that tuberculosis is present may be doubted by the laboratory savant, but the evidence is sufficient for the clinician. We often reach a conclusion with less evidence and without waiting for infallible tests. The undue significance given the bacillus has become one of the chief excuses for careless work, and a disinclination to acquire clinical aptitude and proficiency. The examination for bacillus is often imperfect and haphazard, and leads to a deceptive decision. If the whole amount of expectoration for twenty-four or forty-eight hours be collected and a sediment obtained by adding a solution of carbolic acid or liquor-potassæ and then the deposit be centrifugalized and spread on a number of slides the bacillus will be found more quickly in the end, and also more frequently. Practically all cases of pulmonary tuberculosis observed during life may progress to the state when bacilli are perceived, but the extent of the lesion and its effects may be checked by treatment in the meantime. With the admission that the bacillus should be looked for as a positive aid in diagnosis, and that its presence may be quite invaluable in confusing conditions to substantiate or confirm a difficult conclusion, let us dismiss that agent and consider other methods which we are compelled to employ. Most of them were well known to some of the older authorities, but they have assumed added significance as our knowledge of proper care has advanced

eir study and application require more effort, time and ience than the dispatch of a specimen and the receipt of a ort.

HISTORY, HEREDITY AND PREDISPOSITION

When tuberculosis is suspected a careful consideration of the ily and individual history becomes more and more important, ause the diagnosis and prognosis are becoming very closely ed. A case may be incipient and favorable or unfavorable. e importance once assigned to heredity has undergone a decided nge. This is apparently somewhat due to the fact that we y call things by other names. The statement that the dise cannot be inherited or directly transmitted is not entirely e, because the bacilli have been found in the placenta and the us of the tuberculous mother. Exactly how predisposition l account for the tendency of the young children of tubercuis parentage to die of tuberculous meningitis, and other forms tuberculous disease, is not quite clear, and I fear the last word cerning heredity, predisposition and latency has not been said. nething is inherited which makes it worth while to scan the ily history and remember that types and tendencies should ; be overlooked. The recent attempt to discover evidence of munity conferred by tuberculosis parents might be very inter- ng if it rested upon more substantial proof.

Valuable information can often be obtained by investigating possible or probable opportunity for infection. Has the ent been exposed by occasional or close contact with a conptive in the same house or shop? This is particularly imant when the contact has been prolonged, or proper preventive sures neglected. Kaiserling and others have shown that the se can often be found by examining members of the family exposed. Sometimes repeated examinations of the appary healthful person, who lives with a consumptive, will re- the evidences of disease before any symptoms appear or at- the notice of the individual. I offer an illustrative case. S. lived in close contact with and cared for a sister suffering advanced consumption. To the best of my knowledge proper s for prevention were observed. Miss S. called upon me l times at intervals of two weeks, requesting an examinaf the chest as a safeguard. In the course of time I disd signs of an invasion of the left apex. She was apparin robust health and betrayed no symptoms whatever. Two

and one-half weeks after the discovery of the disease a slight cough and an evening rise of temperature developed. There was a very slight loss of flesh and no expectoration. She was sent away and seven weeks later the expectoration contained bacilli. She apparently recovered and remains in good health after the expiration of two years. These cases offer the best opportunity for the study of slight lesions during the stage of invasion.

An effort should be made to learn if the patient's history reveals evidence of a preceding attack. The lesion under observation many be secondary and due to an auto or reinfection. Antecedent attacks and the signs of an old lesion are much more common than is generally supposed. The patient may recall a period of ill-health characterized by fever, loss of flesh, etc., ascribed to a cold or the grippe, or possibly the symptoms of a localized pleurisy may have been present. An examination may disclose both the old and the new focus of disease. There may be signs of a healed or quiescent lesion in one apex and active disease in the other. Again, and this happens rather frequently, a quiescent or temporarily closed area of tuberculous lung may after an indefinite time display acute exacerbation and be mistaken for a primary infection.

The opinion that all pleurisies are tuberculous in origin is already in process of revision, but the history of attacks not accompanied by pneumonia may be included with suspicious testimony. The presence of bacilli in the pleuritic effusion can sometimes be determined by inoscopy when other procedures fail. Even if we assume that a large percentage of cases of pleurisy with effusion are tuberculous in origin, it does not follow that tuberculosis of the lung will accompany it or even supervene.

The following definition of incipiency has been adopted by the National Association for the Study and Prevention of Tuberculosis:

"Slight initial lesion in the form of infiltration limited to the apex or a small part of one lobe.

"No tuberculous complications. Slight or no constitutional symptoms (particularly including gastric or intestinal disturbances or rapid loss of weight).

"Slight or no elevation of temperature or acceleration of pulse at any time during the twenty-four hours, especially after rest.

"Expectoration usually small in amount or absent.

"Tubercle bacilli may be present or absent."

Obviously any brief definition will be subject to criticism and nnot for many reasons be employed arbitrarily. Tuberculosis both apices may be slightly manifest and the condition favorle, but as a rule it is followed and not accompanied by involvement of the other. The inclination to regard incipiency simply relation to time is quite general. The duration of the disease quite conjectural, and with few exceptions it has been present uch longer than is assumed. A morbid process may also be rent and yet extensive, progressive or very grave. A slight lesion ay produce profound systemic disturbance or the individual restance be unusually marked.

In considering symptoms it must be remembered that we are aling with an insidious disease. From the time of infection onths may elapse before objective or subjective symptoms are nounced. Those deserving special study are in the order of eir importance hemorrhage, fever, loss of weight, chlorosis or æmia, loss of appetite and cough with or without expectoration. ll these symptoms are rarely associated in the early stage.

HEMORRHAGE

Hemorrhage occurring during the incipient stage or as an initial nifestation seems to be somewhat rare in the Eastern States. my experience it is recorded in about 5 per cent. of this ss. At the New York State Hospital an examination of the tories of 285 cases of incipient tuberculosis shows that hemorge occurred in 19 per cent. When other causes have been exded its significance cannot be too strongly emphasized, and history of a hemorrhage antedating by months or years more ent suspicious symptoms should invite a search for a previous ion.

FEVER

A rise of temperature at some time during the twenty-four urs is probably the most frequent symptom upon which we may ace much reliance. This symptom is more frequently overlooked an any other. There is absolutely nothing to be gained by askg the consumptive if he has fever. The advanced case will sit the physician's office daily, if the physician is foolish enough allow it, and insist that he has no fever when the thermometer ll record a temperature characteristic of typhoid fever. A temrature of 103 or 104 is frequently seen. Not more than 2 r cent. of the early cases will have any sensation of fever.

The highest elevation of temperature usually occurs between the hours of 4 and 7:30 p. m. The morning temperature as a rule is normal or subnormal even in febrile cases. Consequently little or no dependence can be placed upon any observation at that time. If a case is to be closely studied, the temperature should be taken every two hours from morning until evening and the rectal temperature is more reliable. There are instances when the presence of fever is entirely overlooked unless this rule is followed. Thus a marked daily rise of temperature may occur only at noon and be absent in the afternoon or evening. It is a wise precaution to examine a suspected patient in the evening. Exposure to cold air, particularly if prolonged, has an influence upon the febrile curve. Allow the patient to wait until he is warm on a cold day. Otherwise the thermometer may require from four to ten minutes to register the actual temperature. Many of the new cheap thermometers require an insertion of several minutes instead of one to register properly. Whether the temperature is taken after exercise or rest will be more noticeable in a consumptive than other patients. Fever is usually more marked in children than in adults suffering from tuberculosis, and it is often temporarily increased during menstruation and an attack of indigestion. A diurnal rise of temperature due to syphilis, intestinal toxæmia, or neuræsthenia is apt to be most puzzling and sometimes difficult to exclude. To assume that an active lesion is always associated with fever may be misleading at times, but it is often an excellent guide.

Loss of weight is usually slight and gradual, not rapid and great. The standard of weight for the individual should not be fixed at the highest ever attained. Age, habits, and the mode of living should receive attention, and the statements of patients concerning their normal weight is often most unreliable. In view of the chances for error it seems safe to compare the present with the average weight while in health. There is usually a difference of two or more pounds between the morning and evening weight. The loss of appetite and indigestion are of decidedly relative value because they are so common in other conditions. Chlorosis and anæmia are much overestimated as early symptoms. They are frequently due to other causes and more frequently follow extensive disease than precede the state of invasion. The fact that chlorosis and neuræsthenia have an influence upon the prognosis is another matter. A decided leucocytosia, however, may be of

signal assistance at times in eliminating tuberculosis and directing attention to other forms of infection.

COUGH

Practically all text-books lay stress upon the cough as an early and most constant symptom. Very often it is due to pharyngeal irritation and subsides after local treatment. Many times the so-called hacking cough owes its origin to nervous habit and disappears by an effort of will or as a result of suggestion. It is not nearly so common among men as it is among women. As an early sign of tuberculosis its importance and the frequency of its presence have been much exaggerated, but it performs valuable service by directing attention to the chest. Physicians who visit a sanitarium for the care of incipient consumptives are always surprised by the absence of coughing.

All the symptoms which lead to a suspicion of pulmonary tuberculosis should be considered so far as possible in a group, and their chief importance will be found in encouraging thorough and repeated examinations of the chest. We have learned that symptoms formerly ascribed to a pre-tubercular state are usually caused by post-tubercular conditions. It must be borne in mind that early manifestations, with the exception of hemorrhage, are due to toxæmia, and individual resistance will influence the time of their appearance and their character. The earlier the diagnosis the less pronounced will be the symptoms as a rule.

PHYSICAL SIGNS

In discussing the physical signs commonly associated with incipient disease a few words may well be devoted to the reasons why they are sometimes undetected. Not enough time is spent by the student or physician in the study of normal sounds. The cardinal rule "Compare — always compare" is not always observed. The normal relative difference between the right and left upper lobes are not appreciated. The chest is not thoroughly bared, particularly in women, and the search is not thorough. The ear may not be trained or the hearing acute, and the unmusical ear may be incapable of detecting slight changes or alterations in pitch. The technique of percussion is not an easy art to learn, and is only acquired by practice. The finger is not properly applied to the chest wall, or the improper stroke elicits only the

bony resonance of the physician's finger. The selection of a stethoscope, the fit of the earpieces and the unnecessary length of rubber tubing should be considered. Opportunity for frequent practice gives one an enormous advantage, but even the skilled examiner realizes that absolute concentration of attention and plenty of time are required for careful search. While the immediate application of the ear may be preferred, the spaces above the clavicles cannot be effectively examined by that method.

Experience has shown that any type of chest may be invaded by the bacillus. When invasion is localized and the focus slight in extent the chest will, as a rule, reveal no significant change in conformation. Depressions in the chest wall and relative lack of movement in certain localities are much more noticeable when the disease has advanced to a more marked degree.

By aptitude and much practice the sense of feeling may become very acute and some observers rely very much upon evidence obtained by palpitation. The signs elicited by palpitation are necessarily of a collateral value. The excursion or modified function of a small portion of the lung can be studied more accurately by other methods, and the transmission of fremitus as revealed by sense of touch at the apex may be very deceptive. Many teachers and text-books apparently assume that the chest is to be examined while the patient breathes in the natural or accustomed manner. After an individual has relinquished active exercise the full deep breath may be a rare event or an exertion. This is particularly true of women. Furthermore, deep expiration very frequently must be taught. Probably one of the principal reasons why the early signs of pulmonary tuberculosis escape attention is the fact that full exercise of the lungs is not enforced to gain information not revealed otherwise. It is quite frequently impossible to find distinctive signs without obliging the patient to breathe in and out forcibly. The movement of the tip of the lung, the extent of impairment or consolidation, the character of the expiratory murmur and the presence and nature of rales can very often only be determined by this method. A proper examination should include observation during natural and forced respiration. The commonest location of beginning disease is at the apex and the initial focus is apt to be found about one and one-half or two inches from the tip of the lung posteriorly. An analysis of the histories of 285 incipient cases admit-

ted to the New York State hospital shows that the lesion was located as follows:

Right upper lobe	171	60.5%
Right lower lobe	14	4.9%
Left upper lobe	98	34.3%
Left lower lobe	2	.7%

When tuberculosis of the lung accompanies or follows pneumonia or pleurisy it is more apt to develop in the middle or lower lobes, but our attention to-day is confined to the insidious incipient variety. Percussion and ausculation should include the apex of the lung which extends during inspiration one to two and one-half inches above the clavicle. The note on percussion will show relative dullness compared with the other apex or another portion of the lung. Strong and light percussion may both be necessary to bring out the sound and the note can be analyzed or defined as shorter in duration, higher pitched and quality modified. Sometimes if the change of pitch cannot be appreciated it is of assistance in comparing to hum and endeavor to imitate the gradation of change. At times a sense of resistance to the finger can be felt. Delimit by percussion the movement of the tip of the apex in the region of the neck and mark with a pencil the height to which it rises upon full inspiration. The diseased lung may be restricted by infiltration, consolidation or adhesions and the extent of its movement modified proportionately. Of course, one must remember that the right apex is normally relatively dull and higher pitched than the left. A lesion at the right apex is for this reason more difficult to recognize but the danger of error has been decidedly overestimated by some authorities on physical diagnosis. The note on percussion can be compared with adjacent areas and by repeated examinations the extension of the dull area can be watched. Again the play of the apex can be quite accurately determined by Kornigs' method.

The change in the respiratory murmur most frequently revealed by ausculation may be characterized as modifications of broncho-vesicular breathing. They are distinguished by slight increase of tubular character, and the expiratory sound which is the essential element to study is relatively higher pitched and prolonged. Decided confirmatory evidence will be found if fine rales can be detected. They must be distinguished from the coarse

distinctly moist rales in the larger tubes. The older English clinicians distinguished between them by the terms clicks and rales and the words are as truly descriptive to-day. The clicks crepitation or fine rale is often unobserved for several reasons. They may be very few in number, fugitive or occur in showers. They may often be heard in the morning before expectoration has cleared the locality of secretion which accumulated during the night. The essential test is to oblige the patient to cough and breathe deeply. Many times they only appear after several efforts in coughing have pulled apart the mucous coated agglutinated structures. Physicians occasionally disagree because one will hear rales and the other will not. The time of day, the temporary condition of the lesion and the method employed may account for the difference in observation. In some instances the only sounds discovered by ausculation are diminished breath sounds. In such cases signs of activity may be heard over adjacent territory and particularly near the clavicle. If only suppressed breathing is heard other signs must be considered to obtain evidence of a deposit, which is almost sure to be tuberculous at the apex if there is no evidence of other thoracic disease. Cog-wheel respiration may lead to suspicion but it is not of distinct diagnostic value. It can be heard in many nervous patients and may be found on one examination and absent at another. A distinct friction sound which can surely be designated as such is rarely heard except when the lesion is old, and it is much more indicative of a secondary pleurisy when its appearance is temporary.

Finally the transmitted whisper is of decided value in confirming the presence of morbid changes over a small area. Many times the increased audibility and high pitch of the sound will denote infiltration or solidification and remove doubt caused by indefiniteness of other signs. The transmitted whisper affords a much more delicate and reliable test than the speaking voice, particularly if the latter is high pitched, weak and not penetrating. I have deliberately avoided mentioning roughened breathing during inspiration as a reliable sign. If the word harsh as employed by the Germans has been confused, that is another matter, because harsh breathing may be simply a modification of bronchovesicular breathing which becomes more marked later. The differentiation between a recent slight lesion caused by tuberculosis or syphilis or one following influenza is seldom called for,

it it can usually be accomplished if the history and all the inical evidence is closely scrutinized.

TUBERCULIN TEST

The tuberculin test as a positive indication of tuberculosis ers opportunity for difference in opinion and discussion. The berculin is injected into the patient, not into the physician. his may explain somewhat its frequent employment when quite inecessary. The unprejudiced observer who has watched the endulum swing can still afford to be conservatively skeptical ncerning some positive tests. The character of the product, ie dose and the technique certainly require more consideration ian has generally been given them. My personal experience has een very slight because instances when its use might seem ecessary or justifiable have been extremely rare. Opportunity observe its employment by others when it seemed unwarranted d savored of needless interference have been more common. fter the other evidence of pulmonary tuberculosis has been refully collected and sifted, if doubt still exists, continued tchfulness will practically always remove uncertainty in a ort time without great detriment to the patient. The most oficient examiners use the test the least or not at all. A re- tion may not furnish the knowledge which the clinician de- res. If we are willing to assume that the reaction is infallible must still decide if possible where the implanation exists and hat is its character. Allow me to cite two characteristic in- inces to exhibit the possibility of error if a diagnosis is based on this test. An opinion was ventured that one man was ffering from aneurism of the arch of the aorta and another sarcoma of the mediastinum. Other physicians disagreed and cribed the manifestations to tuberculosis of the lung. Both tients were given tuberculin and decided reactions followed. positive diagnosis of tuberculosis of the lung was then made. th of the patients died within a few months, and an autopsy vealed no evidence in either case of any disease in the lungs. ie original diagnosis was confirmed. Whether tuberculosis sted elsewhere in these patients I do not know. The uncom- mising advocate of the tuberculin test always has the advan- e because no tangible evidence is required. Within the last v months a physician of my acquaintance has been applying modified test to the conjunctivæ of his friends in accordance

with Calmette's method. Three of them, who have passed middle life and are apparently in perfect health with no history of tuberculosis, responded to all requirements. But the contribution made by Franz is most interesting and suggestive. He tested with tuberculin the members of two Austrian regiments. They were supposed to be in good health. Sixty-one per cent. of those in the first year of service reacted to doses of 1 to 3 Mg, and 68 per cent. in the second year of service reacted to similar doses, but, not content with these results, Franz asserts the belief that the injection of 10 Mg would have shown 100 per cent. of reactions. The purpose of this investigation by Franz was to learn the number free from tuberculosis. Evidently the clinician will have to be content with the recognition of tuberculosis when he can perceive evidence of its location, extent and character. When the tuberculin test seems to be demanded, what conditions which may give a similar reaction shall we exclude? Will the influence of suggestion and the presence of syphilis or chlorosis complete the list or are there other causes still unknown which may mislead?

TREATMENT

When the consideration of treatment is limited to the incipient case there is slight room for any controversy. The earliest possible diagnosis should be followed by the immediate employment of the only method or procedure which promises anything. The prime requisites are rest for an indefinite time, pure open air and a full diet. The patient should be under the care and control of a competent physician, and discipline is an essential attribute of the plan. There are many details in management which influence the result, but time will not allow of their discussion. One very essential part of the treatment is often disregarded. I refer to the mental condition of the patient. The patient who can gain admission to a properly conducted sanitarium has a decidedly better chance for recovery than another who is not under close observation. A rigid routine and close supervision of the character and quantity of food are large factors in the result. Most patients reach recovery by the aid of the alimentary tract. A change of climate undoubtedly contributes much toward recovery, especially if it is more favorable for treatment or allows more comfort. The advocate of home treatment does not usually spend his vacation in his back yard. Cer-

tain localities have gained a reputation for supplying conditions exceptionally favorable. Purity of the air and freedom from dust are two of the essentials. The climate of Colorado and some regions of New Mexico and Arizona offer advantages not to be found in the East. Dryness and equability and a much larger amount of sunshine constitute the chief attributes of superiority. The ability to seek a favorable climate and environment is limited to the few, but fortunately experience has demonstrated that the incipient will recover in a large percentage of cases by proper care in his own State or county. In this State there are numerous localities, some known and many untried, where excellent results can be obtained.

MORE EXTENSIVE PROVISION FOR THE POOR

The immediate imperative demand is for more extensive care of the poor consumptive. There is little encouragement now to provide greater opportunity for common-sense treatment if the disease is not recognized until too late to secure easily obtainable results. If the demand for enlightened care and greater accommodation for the earlier cases were made by the physician and the sufferer, comprehensive plans for relief could be devised and executed. This State has inaugurated the movement and the experiment has proved to be a complete success. Sanatoria designed for curable cases should be scattered through the State, and we should count the inmates by thousands instead of hundreds. The buildings and equipment can be and should be made inexpensive. The model sanitarium for the poor in the future will be the one which costs the least and accommodates the greatest number. The money will be spent for food and not for luxurious buildings and rooms. Every dollar wasted helps to deprive some unfortunate of a chance for his life.

A physician qualified to conduct a sanitarium according to modern methods can obtain better results if you give him a barn with enough openings and a kitchen than some of the county and city hospitals, where the old routine is followed. Young men trained in the diagnosis of tuberculosis and the method of sanitarium care are greatly needed in this country. The development of State care alone will necessitate this new class equipped with expert knowledge. Good results are obtained in apparently unfavorable climates if simple rules of management and the introduction of essential requirements are combined. The place

to study methods of control and treatment is at a hospital for incipient consumptives, not a home or boarding-house falsely called a hospital, where advanced cases wait for death. There are great advantages to be derived by sending the poor consumptive of the curable class some distance from home to an institution favorably located with relation to helpful influences. Visiting and distraction is obviated, more strict control is possible and the patient realizes that he must devote months to one object.

I have on several occasions presented arguments to show that the care of the early case should be intrinsically a State problem, and time and experience strengthen the hope and conviction that the State will ultimately be gradually forced to assume the charge. I know of no work which should appeal so strongly to your association as the promotion and encouragement of this reform. Our battle for improved care of the consumptive is not won because we lack harmony in ideas and unity of purpose. One urges home treatment, another would devote all care to advanced cases; many would confine all action to prevention, and some in the rear ranks want to try one more alleged remedy, or are waiting for the discovery of a specific curative agent. At present the revival of tuberculin treatment, in the form of small doses administered through a long period, seems to be gathering force for a wild sweep over the land. At times the history of medicine seems to have been written in vain, and all the grim wrecks strewn along the crooked path of progress are totally disregarded. The widespread, general and indiscriminate use of tuberculin will cause infinite harm. The fact that the dose advised is so small that no direct ill-effects will follow is not the question involved. A danger lies in reliance upon a form of treatment which if used alone will prove disappointing. Patients unwisely selected for this treatment are being kept at home while months are consumed in the trial of a new method, and the fact is unheeded that those who have had sufficient experience to form any judgment of its value have employed the remedy in carefully selected cases, who also enjoy the beneficent hygienic conditions which are known to be the most successful. The results, when any are claimed, are rather indefinite and to a certain extent assumed. Tuberculosis is pre-eminently a disease of exacerbations and lulls, and this fact, coupled with the mental effect produced by any new treatment, accounts largely for remarkable effects observed by enthusiasts. It would be

ult to devise a method of treatment more financially remu-
tive to the unscrupulous and selfish physician. An excuse
be offered for keeping the patient at home indefinitely, and
necessity for making a prompt diagnosis and sending the
nt elsewhere is avoided.

CONCLUSION

ıe great white scourge must be attacked by manifold measures,
the problem is colossal. Science must be blended with pity,
ity and remorse. The results of stupidity, apathy and
ct must be met and remedied. The dangerous consumptive
e neglected consumptive. The unafflicted must be protected
the living dangerous victim who typifies the accusing appall-
proof of inaction, and the hopeless wreck should have his totter-
veary journey to the grave made as easy and gentle as the "ebb-
flow of life" will permit. The hope of redemption and the
lt of the chief struggle in the conflict will depend principally
ı one fixed resolve.

Find the consumptive at the right time and help him in the
t way until he is well. If you ignore or neglect him too long
the full penalty by protecting the public and helping the poor
im until he is dead."

t one time most of the consumptives died because they were
. Now most of them die because of ignorance and apathy.
medical profession needs education as much as the public.
llies of eternal babble" will not conquer consumption. There
been plenty of talk; what we want now is action aroused by a
ıg sense of duty and governed by common sense.

MMISSIONER PORTER — The next paper on the program is by a gentleman is president of one of the sections of the International Congress — the on which deals with the hygienic, economic and social aspects of tuber-is. There is no man perhaps whose work along organized charity is r known than that of the next speaker. And no one's advice in such ers is more anxiously sought for than that of Dr. Edward Devine.

THE DUTY OF THE STATE IN THE PREVENTION OF TUBERCULOSIS

BY EDWARD DEVINE, M.D.

Secretary of the Charity Organization Society of New York City

You have instructed me, Mr. Commissioner, to lay down the law with regard to the duty of the State in the control and prevention of tuberculosis. It appears to me better not to discuss the matter in the abstract, but rather with immediate reference to our own situation in the State of New York; and from this point of view, having Raybrook and other existing institutions in mind, appreciating the limitations of existing statutes and the powers of our health authorities, it may be said that the whole duty of the State, acting through central and local authorities, is to be summed up in two words, control of advanced cases, and popular education in the means of prevention.

I assume that in the treatment of tuberculosis, as of other diseases, there is a large place for the private physician and for the ordinary relation, both professional and pecuniary, between doctor and patient. I assume also, that there is an honorable place for the hospital and sanatorium in which patients pay in full for their maintenance and medical care. The State has not yet undertaken responsibilities to the exclusion of these elementary principles; all our theories of State action imply that the private practice of medicine is to continue, and that free hospital and sanatorium care are for the poor. Possibly different theories may be in the air; possibly the State may eventually put the care of the public health where it has already put provision for public education; but we have no warrant as yet for formulating such a policy, and far short of it there is still abundant opportunity for all the useful State activity which we may reasonably expect.

By far the greatest part of the treatment of early cases will fall within this domain of private practice and private sanatorium care. The reason is obvious. If the disease is discovered at all in the early stages the patient is still as a rule financially independent and self-reliant in choosing his own course. He is unwilling, naturally, to stop work for a protracted period, or if, on stern medical advice, he adopts this course, he can still determine for

himself, under advice, where and how he shall live, and he has some resources in savings, relatives, employers, friends; or some slight earning capacity; or, failing these, there are a number of semi-charitable institutions like Stony Wold, Loomis and others from which, in the early stages, free or inexpensive care may be obtained. There are exceptions — a few who cannot care for themselves and for whom there is no private provision, and for these such institutions as Raybrook and Otisville may properly provide. If, however, we may judge by the vacancies in these institutions, and by the number of really suitable applications which they receive, there is at present no need of further provision of this kind, even in the city of New York, where the need is doubtless greatest. The situation appears to be that the supply of beds for strictly early cases is equal, or very nearly equal, to the demand; and, through the carrying out of plans already made, will remain so, unless the standard of care in these institutions should be considerably raised, their attractiveness as places of abode considerably increased, and of this there is no apparent probability, and, it may be added, no very great need.

So far as intermediate and advanced cases are concerned the situation is far otherwise. Even for those who are now willing to go into the hospital, there is not room enough. There are thousands more who, given an ideal system of widely distributed local hospitals near of access to the homes of the poor, could readily be persuaded to come into the hospitals for the better care which they ought to have, and for the incidental protection of others which such removal would insure. There are hundreds of others throughout the State, who might not voluntarily accept hospital care even after enlightening education and persuasive argument, but who are so dangerous to their neighbors that they should be removed as in other cases of contagious disease. For all of these three classes, therefore, increased hospital or sanatorium facilities are required:

1. Those who are anxiously seeking institutional care, but for whom it does not exist;
2. Those who might reasonably be expected by proper educational means to be brought to the same state of mind, and
3. Those who, as a last resort, should be removed from their homes as centers of infection.

Even of this something is done on a commercial basis, and something is done by private philanthropy; but it is obvious that

neither method will do anything like so much for the advanced as for the early cases; private enterprise because such patients, in the vast majority of instances, have exhausted their resources and cannot pay for their care; and private charity because there is for them a less hopeful outlook, and, as the resources of philanthropy are not unlimited, it is natural that they should be devoted first to the care of those who, in a comparatively limited period, can be restored to health and to wage-earning capacity. A few foundations, mainly on a religious basis, are likely to be maintained from pity and in order that the dying may receive the consolations of their religion; but even in these institutions there is a tendency, while maintaining a religious atmosphere and control, to ask the State for financial support, so that we may look forward to a time, if it has not already come, when through the absence of business enterprise in this field and the inadequacy of private charity, practically the entire burden of maintenance for advanced cases, save for the wealthy, will fall upon the broad shoulders of the State. This is by no means altogether to be deplored, for with support naturally goes control. The more complete the responsibility for the maintenance of a particular class the more complete will be the opportunity for the working out and carrying into effect of a rational policy which shall be comprehensive, adequate and effective.

When it comes to a statement of a policy for the State to pursue, in dealing with that large part of the problem which remains after eliminating private enterprise and private charity, there still remains one serious complication, viz., that it falls partly within the province of public health, and partly within that of public charity. In other words, we have to do here with the care of the poor and with the protection of the public health. If these two departments of administration were combined in the hands of the same persons the task would be simpler, at least simpler theoretically, though perhaps not in practice, since after all there are two things to be done, and if the same authorities were intrusted with both it is very likely that one or both would be neglected.

Taking things again as they are what needs to be done by the health authorities is to protect the public health, and what needs to be done by those who are charged with the care of the poor is to provide sufficient and decent accommodation for such as need public care. In other words, this first duty of the State is to

provide either through a modification of local almshouses and public hospitals in the cities and towns, or by a system of State hospitals numerous enough and widely distributed throughout the State, for those advanced cases which both humanity and public policy would remove from their homes.

There seems to me no sufficient reason for transferring this responsibility from those who are already by law charged with the care of the poor. The commissioner of charities, the overseers of the poor under the guidance of the county superintendents of the poor, and the State Board of Charities, would appear to be the proper authorities to undertake it. Already in many cities and towns they are acting in an enlightened way, and the whole duty of the health authorities, with reference to the matter, would appear to be to awaken the overseers and commissioners to their duty to help them to secure the necessary appropriations, to render in suitable ways professional counsel and direction, and to co-operate with them in securing public approval for a vigorous policy and acquiescence on the part of patients in the better treatment which these special hospitals afford.

It follows that the disposition, which has been shown in sporadic instances, for health authorities to ask for funds to establish such institutions under their own auspices is a mistake, tending to confuse public functions, and resulting in a less efficient discharge of the respective duties of the two great co-ordinate branches of administration, relief of the poor, and protection of the public health.

In distinguishing thus sharply between hospitals and sanatoria for advanced cases in which we are still sadly deficient, and sanatoria for early cases of which we appear to have a sufficient supply, I would by no means wish to imply that the hospital for advanced cases should be so planned or managed that the faces of its inmates are turned irretrievably and continuously toward the grave. Assuming competent management and a due sense of responsibility it would perhaps not be too much to say, as I believe it has been said, that there might advantageously be some early and intermediate cases in all such hospitals. At any rate, until prediction in individual cases is far more certain than at present and until the personal element in recovery from disease is a more calculable factor, it should, of course, be assumed that every case is a hopeful case, hopeful at least of arrest and improvement under favorable conditions, hopeful that

the inextinguishable hope of the patient itself may have more foundation than other, and after all it may be irrelevant, cases would indicate. The spirit of research, of scientific advance and of personal sympathy are as much in place in the hospital for advanced cases of tuberculosis as anywhere.

Neither would I wish to be understood that the conventional hospital of the present type is the only resource for dealing with these more advanced cases. The day camp in which the patient sleeps at home, but spends many hours of every day under good conditions and wise direction, may have undeveloped possibilities. The special dispensary, as an adjunct both to the hospital and to the day camp, has certainly a very important role to play at least in the transitional stages of the next few years. Both of these, however, and indeed to a great degree the sanatorium itself, are to be looked upon rather as parts of a system of education in the control and prevention of a disease than as a thoroughly satisfactory means of treating individual patients. The conclusion of the whole matter is, with reference to this branch of my subject, that we should seek liberal appropriation for advanced cases, that we should in all suitable ways, by giving such institutions appropriate names, by their location, by the standard of physical comfort maintained in them, by the medical and nursing service, and by suitable educational propaganda, encourage their use; that they should be branches of our general system for the care of the poor, but that the health authorities, by additional legislation, if necessary, should have the power in extreme cases to direct the removal of patients to them, and to determine the length of their stay; while to the health authorities also will fall the natural leadership in convincing the various communities of the need for them and in determining their general character. In default of time to discuss the details of the construction and management of such institutions I may refer to the hospital already established on the Poor Farm of Erie county, at Rochester, and on North Brothers Island, N. Y., as close approximations to the kind of institution of which in New York State at the present time we should have at least one in every county, and in the more populous counties a varying number, probably not less than one to each 250,000 of the population.

In discussing the first part of my subject, the care and control of advanced cases, I have already to some extent anticipated the second — public education in the prevention of disease — and

yet the field of public education extends illimitable distances beyond the incidental opportunities which present themselves in connection with provision for advanced cases. If the State is really to concern itself with the protection of public health, as the establishment of State and local boards of health seems to imply, and if it is to intrust to this branch of the public administration any duty beyond that of the abatement of recognized nuisances, then it is evident that the first elementary, fundamental, absolutely essential condition of such a policy in this State and in all our States has still to be met.

And now I have need to summon my courage if I would really deliver my message and rightly interpret my mandate. For what the State has not yet done, but must do, if through the health authorities there is to be carried on an effective educational propaganda, is to educate its health officers. If this were an original idea of my own, and if no one connected with the administration of a health department had recognized the need of which I speak, I would still, I think, venture to tell the truth about it, but it would be with somewhat more apprehension than I now have as to how the proposition would be received in this conference. But as the most competent and eminent health official of whom I have any knowledge has not hesitated to suggest, at least in private conversation, that the most important element to-day in the whole movement for the prevention of tuberculosis is not the sanatorium, the day camp, the dispensary, the visiting nurse, the illustrated lecture, the instructive leaflet or the relief fund, but simply and solely the creation of a new type of public health officer, I have the greater assurance in blazoning that idea abroad, here where it will be most appreciated; possibly with the reckless irresponsibility of a layman, but also with the profound conviction of a citizen who conceives that the community has a right to expect greater results from the large expenditure of public funds for health purposes than have yet been realized.

There is little need in this presence to dwell upon the lamentable conditions under which health officials now obtain their positions and the miserable terms upon which they hold them. The spoils system survives here in the place from which in common decency it should first of all disappear. Fear of offending this and that citizen paralyzes the arm which might have been strong for the protection of the common welfare. Prejudice and superstition surround the health officer; and even his brethren in the

medical profession, from jealousy and selfishness and partisanship, fail to come to his support. His position is too often without dignity, authority, influence or respect. All these the health officer might conceivably gain if he had been trained for his work, if he had within himself the confidence which comes of knowledge and skill, if there were professional standards to which he might appeal; but these also are lacking. To be a health officer in this State of itself means practically nothing. This is a pretty sweeping statement I have read but as I go along I will allow it to stand as it is. It means practically nothing. The few exceptional instances where a strong personality or favorable conditions have made it otherwise are not due to any general policy. Even the men who have made themselves as health officers indispensable are not compensated properly for their public services, but are as a rule maintaining themselves by their private practice and contributing from a sense of public duty that service which the State should in every community be in a position to demand as a matter of right.

It goes without saying that political consideration should be absolutely excluded from the administration of a department of public health. Until this is done we may expect to see everywhere such exhibitions of ignorance, incompetence and cowardice as I have myself had occasion to observe before now, not only in a city of 4,000,000 but even in a higher degree in a suburban city of less than 20,000.

The elimination of politics is only a beginning. No one should be appointed a health officer who has not prepared himself specifically to deal with questions of public sanitation. The water supply, the milk supply, food markets, the disposal of garbage, the drainage system, the cleaning of streets, overcrowding, the disposal of the dead, disinfection after contagion and numberless other problems many of which have only slight connection with the ordinary practice of medicine, are of vital importance to the public health officer — not that it may be of vital importance to him in securing and holding his position — but of vital importance to the community which he nominally serves.

As Dr. Biggs suggested in his address as President of the National Association in Washington last year, two steps are necessary to bring about these desirable results. First, the provision of the necessary instruction, and second, an amendment to the Health Law restricting appointments to those who have quali-

ied themselves by taking advantage of it. You will notice the ray I have suggested these things. At present there is no place n which one may obtain a thorough course in preventive medi-ine, public hygiene, sanitary science or whatever other term we se to designate the instruction which a public health officer re-uires. The Leland Stanford University, Massachusetts Insti-ute of Technology and Institute of Hygiene, Philadelphia, have ourses of instruction in these subjects, but for the benefit of the ealth officers of the State of New York none of these offer a pro-essional course of instruction of the kind considered desirable to id them in their work. In the absence of private endowment he giving of such instruction is certainly the duty of the State. t is implied so clearly that there can be no difference of opinion bout it in the very existence of health boards exercising the unctions which have everywhere been vested in them. The sraelites who were trying to make bricks without straw were en-aged in child's play as compared with the American community vhich seeks to protect the public health through inspection, edu-ation and compulsion, and finds at its disposal for the purpose ealth officers unpaid or underpaid, selected by political or per-onal favor, dependent for their income on their popularity as hysicians, and without a scintilla of special training for the ifficult profession to which they are called. The result is that he public health is not protected, preventable diseases flourish ncontrolled, and illegitimate and unholy profits are made in ways in which no honest man can soil his fingers and from which ishonest men should be sternly kept by the servants of the people. The general public is slow, as in all things, to appreciate the value f expert service, but expert service is here indispensable and xpert service implies both professional training and permanent enure in office. Most of all it implies a certain mental attitude, n interest in a certain class of problems, a point of view entirely ifferent from that of the medical school, or of the school of iology, or of chemistry, or of agriculture, let us say — not in-ompatible with theirs, even in a broad sense, including theirs ut still distinct — a point of view which comes more naturally, perhaps, to a physician than to any others, but is by no means niversal in the medical profession; the point of view of a jealous guardian of the public health; of a social reformer who can see he point of a housing reform movement, a pure-food movement, a child-labor movement, an eight-hour movement, a small-parks

and playground movement, a movement for the prevention of tuberculosis. We need a school of hygiene, if for no other reason, to create a group of public officials and private citizens who will be ready on all occasions to promote all movements not only for the protection of the public health — that is merely negative though essential; but for the promotion of the public health, for the attainment of that end about which we may assume that we are all agreed, namely, the lowering of the death rate.

Since the State thus has need of trained service and since the professional school which alone can supply it does not exist, it is the first duty of the State to supply such a school, laying broad its basis in all the necessary sciences, including that of government, but adding that special knowledge of the particular subjects in the field of preventive hygiene which will prepare the health officer for the efficient discharge of his duties. With such schools in existence there will be no hardship in requiring that the degree which they grant shall be obtained before one is eligible for appointment as sanitary inspector, as milk, food or tenement-house inspector or in any other position having directly to do with the safeguarding of the public health. As in other transitional periods it would not be unreasonable to make an exception in favor of those who are now discharging acceptably the duties of their positions, but permanency of tenure, a more nearly adequate compensation and an advancing standard may be required of them also; and of their successors such special training as I have indicated in addition, as a preliminary.

A precedent is, of course, afforded by the existing practice in Great Britain, where no one is eligible as health officer until he has obtained the degree of M.O.H. from one of the universities or special schools in which this degree is given. Possibly if a similar requirement were adopted here the existing universities and medical schools would supply the instruction, but, if not, the University of the State of New York, with the aid of a State appropriation, could readily find some way of supplying the need; and the natural order of progress is the school first and the requirement of a degree afterward.

I have dwelt thus at length on the first essential of an efficient system of public education in the control and prevention of tuberculosis, not because it would have been difficult to enumerate many special devices and to recount many interesting experiments in this particular field, but rather because, with an efficient

ıd trained health officer, such an enumeration becomes at once ınecessary. Here perhaps more than in any other field of eventive hygiene there is already a substantial literature and ıat one may call a special method of educational propaganda. content myself, therefore, with laying down the broad proposi- ›ns that it is the duty of the State to take the initiative not only supplying hospitals and sanatoria for advanced cases, and seeing that patients who are sources of danger to others are moved to them, but also in that still more essential education . the whole community in regard to the curability, sometimes mmunicability — where there is carelessness or ignorance — ıd preventability of tuberculosis, and that to this end the one dispensable consideration is a qualified health officer, or in the rger communities a health administration with an ample supply ' qualified health officers at its disposal.

The most important means of preventing tuberculosis are the direct means — those through which the vigor and immunity ' the individual are assured. Pure air, nutritious food, temper- ıce, cleanliness, a higher standard of living — these are the eans by which at last tuberculosis is to be controlled; and it ay well be, therefore, that out of this campaign against the ast prevented of the preventable diseases may come that higher nception of the higher responsibility of the State for the health ' all, even the least, of the citizens upon which the stability of ıman progress and the welfare of mankind depend.

THURSDAY, OCTOBER 17, 1907

THIRD SESSION, 9:30 A. M.

DR. ERNEST WENDE, Presiding

LABOR LEGISLATION IN ITS RELATION TO PUBLIC HEALTH

BY ADNA F. WEBER, PH.D.

Chief Statistician, State Department of Labor

FRIENDS OF THE CONFERENCE: It will be a disappointment to you that Mr. Sherman, who has just retired from office as Labor Commissioner of the State of New York, is not here to present this subject. When he took office two years ago upon the solicitation of Governor Higgins, he was a lawyer of recognized standing and a man of broad vision and intellect but without special knowledge of labor problems. That knowledge he soon acquired and he took hold of the work of his Department and he is now leaving the Bureau of Factory Inspection practically reorganized and the methods almost revolutionized, bringing out a standard of efficiency that has never before been obtained. His considerable experience with the problems of this State made him a very valuable speaker to discuss this problem before a Conference.

LABOR LEGISLATION IN ITS RELATION TO PUBLIC HEALTH

While labor legislation pursues both moral and economic ends, it has primarily the same purpose as this conference — the conservation and improvement of the public health. Those who are most active in promoting labor legislation are more and more coming to realize the need of medical advice in framing and administering labor laws, while the medical profession, on the other hand, is necessarily turning its attention to the subjects of industrial hygiene and the employment in industry of women and minors, which are uppermost in the minds of promoters of labor legislation. Presaging the active co-operation of the medical men and the workingmen in securing better conditions of health in the future is the recent formation of committees from the trade unions to distribute literature on the prevention of tuberculosis, as well as the organization of a national committee of 100 for the establishment of a Federal bureau of health. The medical men most actively interested in the attainment of this desirable object are particularly anxious to enlist the sympathy and influence of laymen, and they have welcomed the co-operation of persons who are prominent in the promotion of labor legislation.

ORIGIN OF LABOR LEGISLATION

As to the close relation of labor legislation to the public health, it will be useful to recall the origin of such legislation in England just about a century ago. The earlier legislation relating to laborers was so wholly different in scope and purpose that it may not properly be classed with modern enactments for the protection of the *wage earner,* who is himself a development of recent times. He has little in common with the artisan or craftsman of the middle ages, whose working-life, with few exceptions, was divided into the three stages of apprentice, journeyman and master. Of course there existed alongside the craftsmen of the middle ages a body of agricultural laborers, who had as a rule risen out of serfdom; but legislation specifically affecting them was not of the protective character. Queen Elizabeth's famous "statutes of laborers," for example, attempted to regulate wages in the interest of employers, and it, therefore, established maximum rather than minimum rates of wages.

It was the growth of capital and the development of the factory system that split the craft guilds into the two classes of employers and employees and created the industrial problems that we face to-day. The factory system, as is well known, took its rise in the textile industry of England, where machinery operated at first by water and later by steam power permitted the utilization of unskilled labor in the processes of manufacturing and led to the employment of women and children in place of men. In the place of the old workroom with its few masters, journeymen and apprentices all laboring together under the same conditions, there grew up the large factory in which were massed many operatives of both sexes working in subordination to a superintendent and foreman. Children who no doubt had previously helped their parents in the home were brought into the mill to perform the lighter tasks, but the change of employment was a most harmful one, for it meant their subjection to a mechanical routine that broke down their spirits and undermined their health. The worst effects of the new system manifested themselves among the pauper children, who were leased or transferred in droves from the poorhouses to the mills. This class of children had been subjected to much neglect and ill-usage even under the guild system when they were let out as apprentices. In factories, where they were concentrated in much larger numbers, the abuses attracted more attention. As early as 1784 the breaking out of

an infectious fever in one of the Lancashire cotton mills brought on an investigation by medical men, chief of whom was a distinguished physician of Manchester — Dr. Thomas Percival, founder of the Manchester Board of Health, as well as its literary and philosophical society. He and his friends failed to trace the fever to its origin, but they diagnosed the effective cause, and their conclusion and recommendations tell us the whole story:

"We are decided in our opinion that the disorder has been supported, diffused and aggravated by the ready communication of contagion to numbers crowded together; by the accession to its virulence from putrid effluvia, and by the injury done to young persons through confinement and too long-continued labor: to which several evils the cotton mills have given occasion. * * * We earnestly recommend a longer recess at noon and a more early dismission from it in the evening to all those who work in the cotton mills, but we deem this indulgence essential to the present health and future capacity for labor for those who are under the age of fourteen; for the active recreations of childhood and youth are necessary to the growth, the vigor and the right conformation of the human body. And we cannot excuse ourselves, on the present occasion, from suggesting to you, who are the guardians of the public weal, this further very important consideration, that the rising generation should not be debarred from all opportunities of instruction at the only season of life in which they can be properly improved." (Hutchins and Harrison, History of Factory Legislation, pages 7–8.)

The county magistrates returned a vote of thanks for the report, ordered it printed and distributed and passed a resolution that in future no poorhouse children should be indentured to "owners of cotton mills and other works in which children are obliged to work in the night or more than ten hours in the day."

In this modest resolution of the magistrates of the county in which the modern factory system had its origin, we see typified the growth of factory legislation throughout the world in the nineteenth century. In England there were other epidemics and other public investigations until Parliament enacted Sir Robert Peel's bill, known as the "Health and Morals of Apprentices Act, 1802," which limited the working hours of apprentices to twelve a day and abolished night work; required the provision of proper clothing, sleeping apartments and instruction in the three R's, and further required factories to be whitewashed twice a year and at all times properly ventilated, etc. From this beginning

actory legislation in England was slowly extended to cover all hildren and forty-two years later to women also. At first apicable only to cotton mills, the factory acts were gradually exended to other textile mills, then to nontextile works (1864), nd finally (1867) to virtually all manufacturing establishments perating power machinery. Efficient inspection, the foundation f the whole system of labor protection, was established in 1833. The historians inform us that the English factory laws were 'always primarily sanitary or educational in aim. * * * As economic measures, the various acts have stood almost entirely n the defensive." The controlling idea was not to destroy or amper individual initiative that was socially profitable, but to raise the level of competition by requiring all competitors to provide as generously for the employees as did the more liberal nd humane employers. Thus one of the resolutions drawn up in 1796 by Dr. Percival for the Manchester Board of Health in favor of a national factory law was as follows:

"From the excellent regulations which subsist in several cotton factories, it appears that many of these evils may be in a considerable degree obviated; we are, therefore, warranted by experience, and are assured we shall have the support of the liberal proprietors of these factories in proposing an application for parliamentary aid (if other methods appear not likely to effect the purpose) to establish a general system of laws for the wise, humane and equal government of all such works."

NEW YORK CHILD LABOR LAWS

As the factory system grew up in other countries, the English experience in a greater or less degree has been repeated; the Southern States with their new manufacturing enterprises, for example, are just now enacting their first child labor laws. But other countries have had the benefit of English legislative experience and have, therefore, advanced more rapidly. Our factory legislation in New York did not begin until 1886, but we have already advanced considerably beyond the mother country in our laws for the protection of child workers. We do not permit children to enter a factory until they are fourteen years old, whereas the minimum age in England is twelve years; and our law treats factory workers between fourteen and sixteen years of age as children, while the English Factory Act defines as children those under thirteen years of age and those under fourteen who have not

obtained an educational certificate. This State requires that every child working in a factory must have on file with its employer a certificate properly executed by a health officer, or by a person duly authorized to issue such certificate, in accordance with the provisions of section 71 and 72 of the Labor Law.

Section 71 was amended during the last legislative session, and every person authorized to issue employment certificates should at once familiarize himself with the amended law to the end that its administration may be intelligent and uniform throughout the State. Three material facts must be satisfactorily established before a certificate should be issued, to-wit: Age, educational qualifications and physical fitness. Evidence of age is of primary importance under the law, and recognizing the difficulty of securing satisfactory evidence the statute provides that such evidence as falls in one of five distinct classes may be accepted. It is urged by the Commissioner of Labor that a sincere effort be made to get a transcript of the birth certificate, which certificate shall in all cases be accepted as conclusive proof of age. The school record should be very carefully scrutinized to see that it is in conformity with the requirements of section 73. We have known of many instances where a school record had been given to a child who was not entitled to receive it. It is the duty of the officer issuing the employment certificate to examine the child in order to determine its ability to read and legibly write simple sentences in the English language. On the question of physical fitness too much cannot be said. The future of the child depends on the nature of the examination it is subjected to. Defective eyesight, weak lungs, deformities and other physical conditions should receive careful consideration in connection with the work the child intends to do.

It is hoped by the Department of Labor that every officer issuing certificates fully realizes the importance of his work. He is an essential factor in the proper solution of the child labor problem. Therefore, the service rendered should be entirely free from perfunctoriness. The records showing the evidence upon which certificates are issued should be carefully preserved so as to be available for examination at any time, and correct lists should be filed monthly in the Bureau of Factory Inspection, showing the total number of certificates issued.

Another important point to be remembered is that "vacation certificates" are no longer recognized in factories, and it would be well to differentiate between factory and mercantile employment

certificates so that manufacturers may avoid the annoyance incident to having a child on a "vacation certificate" — Such certificates, when issued, should bear the words "*Not good in factories,*" in large type, stamped across the face.

We would further suggest that factory employment certificates be printed on white paper and mercantile certificates on blue paper. This in time would obviate all confusion as to the interchange of certificates.

The success of the Department of Labor in its effort to stamp out illegal child labor in the factories of the State depends to a great extent on the degree of thoroughness which shall characterize the work performed by the various boards of health. It is, therefore, hoped that hearty co-operation shall mark their relation to the Department.

HEALTH PROVISIONS OF THE NEW YORK FACTORY LAW

Limitations of time prevent a complete enumeration of the health provisions of the labor laws of New York, which in the modern view are subject to a rather broad interpretation. For example, the demand of the wage worker for an eight-hour day, so far as it has been based on the argument of health, has been a matter of raillery on the part of professional men and others unused to manual labor. But expert evidence has accumulated of late which goes a long way to fortify the trade union argument for a shorter working day in the interest of the public health. Some six years ago a French physician* made an exhaustive study of the health of laborers, and concluded that the abnormal sickness and mortality among working people is due not simply to poisonous or noxious materials, but also to fatigue working on the nerves. That conclusion was strongly corroborated by the experience of L.-G. Fromont, the manager of a large chemical factory in Belgium, who last year published the story of the substitution of an eight-hour for a twelve-hour shift in his factory with most satisfactory results. In the first few weeks there was a loss in wages and product, but as soon as sufficient time had elapsed for the workmen to recuperate the power more or less exhausted during the former long schedule of hours, they maintained and even increased the former output. The most convincing proof of their improvement in health was furnished by

* Ilia Sachnine, La journée de huit heures au point de vue de l'hygiene et de la medicine, Lyon, 1900.

the factory sick benefit fund, which almost invariably showed a deficit until the shortening of the hours of work. Such circumstantial testimony as to the efficacy of the eight-hour day in America has not come to my attention, but an American practitioner of varied experience recently asserted in Harper's Magazine that "the trade unions were overwhelmingly right when they demanded as the first prerequisite for the mental, moral or physical improvement of the laboring man a shortening of the hours of toil. Nothing more degrading or benumbing to all that is best in human nature," says Dr. Woods Hutchinson, "has ever been devised than the grinding, treadmill routine of muscular labor which was exacted of the laboring world fifty years ago, and is yet exacted to-day in regions where laborers are unable to protect themselves. * * * It has long been known that the laboring classes have a low average longevity and a high disease and death rate, and they are subject to an enormous number of diseases from which, according to popular impression, their 'active, natural life' ought to have protected them. The percentage of cases of Bright's disease, of heart-disease, of nervous breakdown, of insanity, is higher among them than in any of the so-called leisure classes. Nor can alcohol longer be made the universal scapegoat. Overwork is a far more potent factor in their production than drunkenness."

The case for the limitation of the hours of work on the part of women employed in factories is of course much stronger and has led to legislative intervention in all advanced industrial communities. In this State the limit prescribed is sixty hours a week or, with certain exceptions, ten hours a day. Male minors (boys sixteen or eighteen years old) are subject to similar rules, while children (fourteen to sixteen years) of both sexes are now restricted to eight hours' work a day, between 8 a. m. and 5 p. m.

In addition to the child labor regulations and the foregoing rules as to hours of work, the Factory Law contains the following health requirements: Seats for female employees (§ 17); painting and whitewashing of walls and ceilings (§ 84); lighting (§ 81); overcrowding (§ 85); ventilation (§ 86); exhaust fans on dust-creating machinery (§ 81); washrooms and sanitary conveniences (§ 88); time allowed for meals (§ 89); special sanitary regulations for laundries (§ 92), for bakeries (§§ 111-116), for tenement workrooms and shops (§§ 100–105), for tenant factory buildings (§§ 94–95).

The New York Factory Law ranks with that of Massachusetts as the most advanced in this country, but with the exception of its regulation of tenement manufactures and of the employment of children, as already mentioned, it is not to be compared with the Factory Act of Great Britain as a code of law adjusted to the peculiar situation and needs of the workers in each industry. The first nine sections of the English Act of 1901 relate specifically to the subject to health, as distinguished from the safety and the employment of immature workers, thus:

Section 1. Sanitary condition of factory.
2. Sanitary condition of workshops and workplaces.
3. Overcrowding of factory or workshop.
4. Power of Secretary of State to act in default of local authority.
5. Powers of inspector as to sanitary defects in factory or workshop remediable by sanitary authority.
6. Temperature in factories and workshops.
7. Ventilation.
8. Drainage of floors.
9. Sanitary conveniences in factories and workshops.

In addition to these general provisions, the English act contains special provisions in fourteen sections for regulating dangerous and unhealthy industries, which are in turn supplemented with upwards of thirty special orders framed by an authorized government official.

In the New York law the subjects of temperature and humidity are entirely ignored, and both omissions are often serious. The inspectors have occasionally ordered factory-owners to provide for the proper heating of workrooms under local ordinances, but they have not attempted to deal with excessive humidity, which is an important subject of regulation abroad. The lack of proper drinking water often in the lower grade factories causes hardship and ill-health, which the inspectors are powerless to prevent. Proper lighting of workrooms is provided for in the law, but we are nevertheless told by the closely observing English physician (Shadwell), who has recently given us the valuable study of "Industrial Efficiency" in England, Germany and the United States, that "a bad light is the most conspicuous and general defect of American factory premises."

national Typographical Union in insuring its members against death and of local beneficiary funds for sickness insurance. The results demonstrate that in this trade at least our workmen are exposed to fully as great risks as are the English workmen, the mortality of compositors from pulmonary tuberculosis, pneumonia and other diseases of the respiratory system being higher in New York city than in London. With the assistance of our new medical inspector of factories, we hope to continue the investigation of the unhealthy industries in this State, which, however, are not so numerous as in some of the other Commonwealths.*

MEDICAL INSPECTION

This officer, the first of that title in the United States, will of course be chiefly occupied in the control of sanitation in the general run of factories and in the examination of children who have attained the legal age but are physically unfitted for certain kinds of employment in factories. The need of such an officer is set forth in the report of former Commissioner Sherman, who says:

"Although about half of the factory laws relate to disease and sanitation, there has never been a single medical officer in the Department. The deputy factory inspectors are competent to discover insufficient ventilation, where odors or extreme oppressiveness betray it; they can see breaks in plumbing, have more than the usual layman's ability to detect disease, and are of course perfectly competent to cope with obvious filth. Therefore, in dealing with grossly unsanitary conditions they are fully competent and have done splendid work, especially in tenant factories and tenement houses. * * * But when higher standards or more difficult questions of sanitation are reached, medical judgment, direction and support is wanted. Courts that will accept a mechanic-inspector's description of overcrowding or filth as evidence of unsanitary conditions will hardily enforce his unsupported opinion as to defective ventilation, etc. And the proprietors of the better classes of factories, who acquiesce readily in the advice or orders of such inspectors in regard to machinery or safety, cannot be expected to accept his decisions upon doubtful questions of sanitation. Therefore, all orders of a mechanic-inspector relative to sanitation, to which there is any objection, should be reviewed and affirmed by a medical expert before a dissatisfied proprietor should be expected to comply with them or before they

* Diseases of occupation are exhaustively treated in the work on Dangerous Trades, edited by Dr. Thomas Oliver of London. The considerable literature on the subject is almost wholly European.

machine shops for only occasional use, to require an exhaust fan is nothing but a vexatious handicap upon industry."

Connected with the requirement just mentioned is another section of the law prohibiting the employment of women and minors in the operation of polishing or buffing wheels. The process of polishing is, however, the only process or trade subject to special rules in this State, whereas a large proportion of the labor laws of other countries is devoted to the regulation of dangerous and unhealthy industries. These include processes in which the material is of a poisonous nature such as lead, mercury, arsenic and phosphorus. Employers and workers in these and other of the so-called noxious or dangerous trades are required to exercise special hygienic precautions, and in numerous industries employment is restricted to adult males, as in the case of polishing and buffing in this State. Owing to the law requiring physicians to register cases of industrial poisoning coming to them in their practice, the public authorities of England are in possession of the necessary data for wise control of the processes involved. Last year there was not a death nor even a case of phosphorus poisoning, and while there are several cases of mercurial and arsenic poisoning notified each year, no deaths have been reported for some time. The most harmful of the industrial poisons is lead, which enters into the manufacture of so many different products; last year there were reported thirty-three deaths and 632 cases of lead poisoning in factories and thirty-six deaths and 181 cases in house painting and plumbing. Anthrax, arising out of the handling of wool, hair and hides and skins, was the cause of twenty-two deaths and sixty-seven cases.

While the five diseases referred to are the only ones that must be registered, there are many other dangerous trades recognized in the English law. Within the present year, for example, Parliament has added a dozen industrial diseases to the schedule of the Workmen's Compensation Act, which places the burden of caring for disabled workmen upon the trade or industry in which they have been employed.

As to the prevalence of such diseases in this country we are without accurate information, for no State has as yet required their registration or notification. A few of the trades have been investigated by the bureaus of labor statistics, especially that of New Jersey. The New York bureau has made a beginning in the same field, having carried through last year an investigation of the health of printers on the basis of the experience of the Inter-

other peculiar mark which might identify them. But the children will alter the certificates to bring them within the law, and we have known where children have sold their certificates to other children. There should be a penalty for so doing. Now you will say — what penalty can you put upon a child? Well the same penalty that my father gave me for lying the first time to him. Invite him out in the backyard and interview him.

Now, about the consistency of the law. The gentleman who preceded me has given you a very elegant paper and it is full of force, but it is a good deal more, it is full of terms that you cannot understand, and it is truly impossible with the Labor Law that is in force to-day for the ordinary business man to understand it. It requires a Philadelphia lawyer to understand it, and I do not think that he could do it justice. The Labor Law says that no children shall work until they are fourteen years of age and then they must get out their proper certificates. Now, the Education Department will issue permits to a boy to sell papers in the streets, where he can stay out until the Lord only knows what hour, 11 and 12 o'clock, and the same child when working under a labor certificate, issued to him, would have to quit at 7 o'clock.

The law prevents them from working in stores and mercantile establishments, in a nice warm place, after 7 o'clock in the evening, but they can go out on the streets and play craps and pitch pennies until they feel like going home. Now, I do not know which is just. I think I would rather keep the child at work.

Indeed in relation to that I would like to relate a little incident that occurred to me a while ago. No child under sixteen can be permitted to work in any establishment of a mercantile nature or otherwise after 7 o'clock. I was sent out with Miss Wright, my assistant, on Saturday night to go to department stores to look after delinquents, if any. I went into a store run by the gentleman who spoke to you yesterday, the Hon. J. N. Adam. I came across Mr. Adam. "How are you, Mr. Robinson," he said, "what are you doing." "I am looking to see that you are complying with the law." He said, "Is that all? Why just as soon as the clock strikes seven you can't find a boy or a girl in this store even with a search warrant. They are in too great a hurry to get out on the streets." He said that around half-past seven or eight these boys, or a lot of them, were crowded out at the back of the store on Washington street playing craps and made such a devilish noise that they had to telephone for a policeman to disperse them. And he said he asked one of the boys where they went when they stopped playing craps out there and he said some of them went to the Lafayette theatre, and some went down to Academy theatre, two of the worst places in Buffalo that should be shut up entirely or at least prevented from allowing children under sixteen years of age to enter.

Make it a State law for both mercantile and factory establishments to have State inspection, inspectors for both of them. We have two for the city of Buffalo, and there is work enough for them to examine and make out working certificates. To issue 2,855 certificates in nine months takes up the full time of one man and sometimes two, and we have over 8,000 stores to inspect. It is impossible for the inspectors to get around and make inspections and do that work in the office. And the gentleman stated that the man who issued certificates should be very particular to state about the eyes and ears of the child and its general health and whether it had any contagious disease, any pimples or things of that kind. The inspectors in that case would have to be physicians if they would issue certificates and see to all this about the child. Now, thank God, I am not a physician. And I want to say that if such a law was passed I should step down and out, because I should not be a fit and proper subject to pass upon the question of whether the child had any eye disease, earache, belly-ache or pimples.

My advice to this gentleman, is this, and please take it to the Commissioner. If he wants to get up an elaborate law that is fair and square to the employer, remember to the employer as well as to the working boy and girl, get the inspectors who are up against the real thing every day — they have got no rules; their's is practice — get them together from, say, the cities of the first, second and third class, in a convention and get their ideas and their experience in these inspections and then make your laws

But as brevity is the soul of wit, for heaven's sake let it be the soul of the law. There is so much verbiage, so many rules. Get it right down to about four or five pages and have it say just what it means and then you can enforce it. If you give ten lawyers a copy of the law, as it stands to-day, and ask them to give their interpretation of it, you will get ten different versions; and how do you expect the ordinary, common, poor fellow like myself, who does not know anything about law, to interpret that law?

Now, about vacation certificates. The wisdom of the Legislature, assisted by the labor organizations of the State in their wisdom, prepared to issue vacation certificates for the two months during the time when the schools are closed — from the 1st of July to the 1st of September. They cut out the city of New York and the city of Buffalo — these are not allowed to issue any vacation certificates. Now these are two cities that need it more than the balance of the State altogether. When we had the right we issued in one season about 1,500. But just across the city line a child can get a certificate issued to him for his vacation if he is over twelve and he does not have to have any school examination to work during these two months. In the city of Buffalo they cannot work at all and they go out and get full of deviltry and into places where they should be kept out of. They get into mischief and we are only planting the seeds of reformatories, penitentiaries and State prisons. The vacation certificate rules should be made uniform throughout the State; also the certificates themselves. They should be uniform and the certificate issued in one part of the State should be good in another.

Parents should be given the right to have their own children work for them before and after school, provided the principals of the schools certify to their attendance. Children should be made to attend the schools, public and parochial, until fourteen years of age, which is the age required by law.

And I want to say that the Commissioner of Health should be empowered to appoint an attorney to attend to all cases of violations of the law in tenement-houses, sanitary conditions and Labor Law cases. It should not be expected that we should attend to these affairs and cases here in the city, as the city attorney has his hands full. And then there is so much legal technicality when you undertake to prosecute a man for violating the Labor Law. I want to know if the officer before whom we bring a case has the right when he grants an adjournment of thirty days for the man to procure the necessary certificates for the child to work, to say to that man — Oh, yes, you can keep that child at work during the time you are getting out the certificate! If he can find anything in the law which gives him the right to say that, I have yet to find it, and I have been looking at it very carefully. I want to know if the law is mandatory or discretionary. The law says that any man who violates the Labor Law shall be fined. But the court does not always take such a view. It says, well, you are a nice man, etc., and lets him keep the child at work until the certificate is ready. What good does that do? It makes a laughing stock of the inspector, and I won't say what it does to the violator and the child, and the judge who thinks this way. Of course you cannot say a word, you cannot kick; he is the supreme power; he would send you up for contempt of the court — but then I never have expressed my contempt of that court. I never could find anything to express my contempt of that court.

There is one thing I want to see in the law that is a very good thing, and it is due to the employer. Mercantile establishments should be exempt from the operations of this Labor Law, from the 15th day of December until the 31st day of the same month, for the reason that the public demands it. The public demands that these people keep open around Christmas, and I think it is no more than right and just as well as generous to the children to allow them to work a little while longer, and there are no stores in Buffalo but what remunerate their children well for working.

I would have all inspectors, both mercantile and factory, stamp certificates that have expired, stamp them expired by limitation, and date them. It would help wonderfully; it would prevent the children from swapping them off and you do not know what we are up against in this mercantile inspection. These children forge certificates. I have one here with me that is forged. They will forge even the birth certificates.

SEWAGE DISPOSAL FOR INSTITUTIONS AND SMALL COMMUNITIES

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In presenting a paper upon an engineering subject so highly developed as that of sewage disposal, one's first impulse is to deal with it from a more technical point of view, or to present only such knowledge as is based upon the latest discoveries or experiments. The speaker's experience, however, has convinced him that it is not so much knowledge of this nature that is desired among our State sanitary fraternity as it is a knowledge of fundamental principles, and of the application of these principles in daily practice. If I am not correct in this view, I hope that I may be pardoned for presenting, in so elementary a manner, what I have to offer upon this subject this morning.

I wish, first, to explain briefly about the origin and composition of sewage, and the standards by which proper methods of sewage disposal are compared or judged; then to describe the various methods which are at present successfully practiced in the purification of sewage; and finally to discuss these different methods with respect to the quality of their effluents, and to their applicability to small communities and institutions.

Sewage has been variously defined by sanitarians as water which is dirty or defiled, or to which they apply some adjective suggestive of physical characteristics or appearance. Since, however, the origin of sewage, more particularly domestic sewage, is the public or private water supply, it has become customary for engineers to consider domestic sewage as the spent water supply. There are, of course, other kinds of sewage, as, for instance, industrial, combined and mixed sewages, which are derived either from specific industries, or from variable mixtures of domestic sewage, industrial sewage and surface water. These latter classes of sewage, however, will generally require special methods of treatment, and since they will rarely be met with in smaller communities or institutions, will not be considered in this paper.

Considering, then, purely domestic sewage, we find that it is derived from the portion of the public or private water supply

used for strictly domestic purposes. This will include the water used for drinking, cooking and culinary purposes; for the laundry, the stables and the lawn; and for the removal of human excreta. If we assume that the original water supply be practically pure and wholesome — one, for instance, derived from an uninhabited watershed, having a gently sloping topography, a sandy or igneous rocky surface, free from swamp lands, and compare with it the sewage derived from its domestic consumption, we find a marked and interesting contrast.

The water derived from such a watershed will be comparatively low in mineral and organic matter. There will be no clay deposits of a sedimentary nature, nor soft rocks of a solvent nature, to give rise to any appreciable amounts of suspended or dissolved mineral matter. Nor will there be any swamp lands, or ponds, in which microscopical organisms can develop, to give rise to any considerable amounts of suspended or dissolved organic matter. What bacteria are washed from the uninhabited slopes, and are retained in suspension in the stream, will be of a harmless variety commonly known as a water bacteria. Finally, and what is of most importance, this water will be practically saturated with oxygen; that is, during its passage through the air as rain, and its flow over, or through, soil that is thoroughly aërated, it will have absorbed as much of the atmospheric oxygen as it is capable, and, in the absence of any considerable amount of organic matter, or microscopic organisms, it will retain its condition of saturation.

Contrast the same water after it has been used in the household for the various purposes outlined above and has been discharged into our system of sanitary sewers. It will now be highly charged with organic and mineral matter, derived from the wastes and washings of the household. The bacteria, which in the original water number only a few per cubic centimeter, will have increased to somewhat more than a million. The dissolved oxygen will have been reduced from a condition of saturation to practically zero, having been consumed in the process of decomposition carried on through the agency of the bacteria.

If the sewage be fresh, or if it be relatively low in organic matter, or for other reasons the supply of oxygen be not exhausted, there will be little, if any, odor to it. If, on the contrary, the sewage be stale, or highly charged with organic matter, or subject to a condition of active decomposition, in the absence of oxygen,

pollution and a more advanced knowledge of the art of sewage purification.

Let us now consider some of the methods which are practiced to-day for the disposal of sewage, and compare in a general way their relative merits in fulfilling the requirements outlined above. Perhaps the oldest and most generally utilized method of disposal is that of discharging the raw sewage directly into a stream or other body of water — more technically known as the "method of dilution." Since this method, as outlined above, is applicable only in cases where a stream is not subsequently used as a water supply, it becomes evident at once that its utility in localities like that of New York State must be very limited. This method having, however, a limited applicability under proper restrictions, it becomes necessary to know *what degree* of dilution will prevent offensiveness.

Experience gained from a study of numerous cases in Europe and America indicate that, whereas no specific rule can be set down, applicable to all cases, there are certain general standards which may be safely followed. The unit usually adopted is the amount of flowing water which is required to properly dilute the sewage of 1,000 persons after it has been thoroughly dispersed through the water-section. When this volume is less than three cubic feet per second, the dilution is not sufficient to prevent offensiveness, even under favorable conditions. When it is greater than seven cubic feet per second, there is rarely produced any offensiveness, even under unfavorable conditions. Between these limits, then, of three and seven cubic feet per second must lie our standard of dilution for any particular case — depending upon the character of the water, the strength of the sewage, the addition of manufacturing wastes and the existence of mill ponds, or stagnant pools, where deposits may occur.

If, then, a community is favorably situated, with reference to a large body of flowing water, the method of dilution becomes a satisfactory one. If, however, it is not so favorably situated, or if the sewage must enter a stream or river which is subsequently used as a source of water supply, or if it is discharged into tidal waters in proximity to oyster beds, this method must be abandoned in favor of some method of artificial purification.

Of these artificial methods perhaps none is more effective than that of filtration, or the slow percolation of the sewage through beds of porous soil or sand. This method has been used for more than a century. It is, in fact, nature's method of purifying dirty

water, which, after rains, flows over the surface of the ground, descends slowly through the pores of the earth, and finally issues as pure spring water.

This method of filtration has been very thoroughly studied for many years, in this country and abroad, and it is now possible to foretell, within narrow limits, how much sewage of a certain composition can be successfully purified when the quality and the size of the sand grains are known. Generally speaking, an acre of good effective sand can be so arranged as to purify indefinitely the sewage of about 1,000 persons. If the sand is coarse and deep, or the sewage has received some preliminary treatment to remove the suspended matters, a still larger amount of sewage can be treated. If the sand is fine, or mixed with loam or clay, this amount must be correspondingly decreased, reaching almost nothing for soils composed mostly or wholly of clay.

It is usual to arrange sewage filters in beds, or units, of a definite size, with the surface nearly level, to insure a uniform distribution of the sewage. Beneath the surface, at a depth of a few feet, is laid a system of collecting pipes or underdrains. The sewage is applied in turn to each of the beds, and, after percolating slowly through them, is collected in the system of underdrains and discharged into the nearest water-course.

When beds of porous material are not available, or land is expensive, it is frequently found more economical to purify sewage by some other method than sand filtration. Of these methods, chemical precipitation has been satisfactorily practiced in the past, and although this method has given way to more economical and effective methods, it is still practiced in many places.

By this method the sewage is passed through tanks, after it has been treated with certain chemicals, such as lime, or salts of alumina and iron. The sewage may be passed slowly through the tanks at a uniform low velocity, or tanks may be filled, allowed to stand for a period of time and then discharged. In either case, the chemicals unite with certain constituents in the sewage and form a coagulum, which settles to the bottom of the tanks, carrying with it and precipitating upon the bottom the suspended matters of the sewage. The relatively clear effluent is then passed off and discharged into the nearest water-course or subjected to further treatment.

This method of disposal at the present time is not considered a complete one in itself, but is practiced as such in some places, and is frequently employed as a preliminary treatment. The

difficulty of disposing of the sludge, the high cost of chemicals and the low purification effected make this method, however, a comparatively expensive one, and the field of usefulness restricted to peculiar local conditions or to the disposal of certain classes of trade wastes.

Of greater utility than the chemical precipitation tank is the so-called septic tank. The origin of this appurtenance in sewage disposal is our well-known cesspool. In fact the septic tank may be considered nothing more than a large cesspool, scientifically constructed and operated, so that the highest biological efficiency is attained. If, then, through a long and narrow tank domestic sewage is allowed to pass, certain results are obtained, depending upon the rate at which the sewage flows. When this rate is relatively high, *i. e.*, the period of detention in the tanks is less than say, four hours, we get a mere settling or sedimentation of the sewage, *i. e.*, a merely mechanical result, with no appreciable biological action. When this rate of flow is lessened, however, and the detention period increased to, say, eight hours, we secure entirely different results. Instead of mere mechanical subsidence, we have, in addition, a bacterial or septic action which produces marked changes in the organic matter.

The biological processes carried on in the septic tank are rather complicated. They are also quite variable in activity, depending upon many factors, such as the composition and age of the sewage, its temperature, the period of detention and the velocity of flow through the tank. The process may be briefly described as one in which decomposition is allowed to continue until the sewage putrifies. The bacteria, working under anaërobic conditions, are able to break down the more complex and unstable organic compounds, and convert them into simpler and more stable ones. This conversion results in a liquefaction of portions of the suspended organic matters, and a liberation of certain gases, such as sulphuretted hydrogen, marsh gas and ammonia. The portion of the suspended organic matters not liquefied either rises to the surface to form a scum over the liquid in the tank, or settles, together with the mineral suspended matter, not previously removed by settling or screening, to the bottom of the tank, in the form of sludge. This sludge must be removed, from time to time, and disposed of by special treatment.

The septic tank thus fulfills a two-fold object: the removal by subsidence of a considerable portion of the suspended organic

and mineral matters, and the decomposition and liquefication of a large part of the suspended organic matter. The organic matter thus converted is in a condition which many believe to be better suited to subsequent oxidation and nitrification than is the case with the raw sewage. And whatever may be said against the economic value of the septic tank, there is little question but that properly septicized sewage is more easily treated than either raw sewage, or sewage that has been subjected to plain or chemical precipitation, and that the septic tank will continue to be a useful preliminary device in sewage disposal for many years to come.

The treatment of either settled or septic sewage is usually accomplished by means of sand filtration, previously described, or by means of coarse grained or rapid filters. Of the latter class of filters there are two general types; the contact bed and the sprinkling filter. Although both are composed of the same materials — a mixture of coarse stone, gravel or coke — and are usually laid out in beds or units, their construction and operation are somewhat different.

The contact bed is usually constructed as a tank, in which the filtering material of graded sizes is deposited, with the coarser material at the bottom. The sewage is run onto the bed until it is full, and is allowed to stand in contact with the filtering material for a definite period of time. During this interval, and under the conditions of ample supply of oxygen, the organic matter is rapidly acted upon by the aërobic bacteria, until it is oxidized or nitrified, *i. e.*, subjected to the last chemical change, or action, in the process of decomposition. At the expiration of this time period, ranging usually from two to four hours, the purified liquid is drained from the bed and discharged into the nearest stream, or subjected to further treatment.

With the sprinkling filter, the construction is almost identical with that of the contact bed, except that the walls surrounding the filter may be omitted. The sewage is, however, applied in a very different way. Instead of flooding the filtering material, the sewage is distributed, through nozzles, over the beds, in the form of spray, and allowed to percolate through them to the underdrains beneath. In this way a better opportunity is afforded for aëration and nitrification, and results show that, not only is the bacterial efficiency of the sprinkling filter higher than that of the contact bed, but that, owing to the better oppor-

tunities for oxidation, a larger volume of sewage can be purified per unit volume of filtering material.

The effluents from both contact and sprinkling filters, though stable in themselves, and generally of satisfactory quality to be discharged into any water-course, are, however, not entirely free from suspended matters. Fine, and sometimes rather coarse, particles of the film, or coating, attached to the stones of the filters, which form harboring places for the bacteria while performing their work of nitrification, become dislodged and are carried into the effluent. These particles are mostly stable, inert matter, relatively coarse and heavy, and subside quickly when the velocity of the effluent is checked. When it is desirable, then, to remove this suspended matter, and secure a clear effluent, it is only necessary to pass the effluent through a settling tank of moderate size and allow the suspended matter to settle out.

Again, we find that the effluents from these rapid filters are not entirely free from bacteria, and in some cases they show a very incomplete removal. These bacteria are, in a large measure, carried into the effluent along with the other suspended matters just described, and are probably of the harmless variety of nitrifying bacteria that have developed either in the septic tank or in the filter. It is also probable that many of them are of the pathogenic species originally present in the sewage, so that there may be cases where it is desirable or imperative to remove not only the suspended matter, but also the bacteria. When this standard of purity is demanded it becomes necessary to resort to supplementary treatment either along lines practiced for the purification of water, such as mechanical or slow sand filtration, or by some method of sterilization.

In passing it may be noted that this stage in the process of sewage purification represents the connecting link between problems of sewage disposal and water purification. The effluents from rapid sewage filters may be very properly compared with the turbid waters of many of our streams, which have received some pollution, and their purification can be accomplished not only in the same degree, but in the same manner as such waters. It will, of course, be rarely, if ever, demanded in practice, that a potable water shall be produced from a sewage effluent, but what may frequently be demanded, especially in the future, is an effluent that is not only sufficiently purified of its suspended or

other organic matters to pass the test of stability, but one in which all of the bacteria shall have been removed or destroyed.

Although mechanical or slow sand filtration can, as suggested above, accomplish these results, recent studies and investigations indicate that it may be accomplished by the simpler and less expensive method of sterilization. In fact, the final purification of effluents represents the most fruitful field of sewage experimentation at the present time. These experiments seem to indicate that sterilization may be accomplished most satisfactorily and economically by treatment with certain chemicals, such as lime and copper sulphate, or by ozone and chlorine, generated electrically from the atmosphere, or from certain salts. The study of the final treatment of effluents, as with that of preliminary treatment of sewage, resolves itself then mainly into one of relative cost and, at the present time, the sterilization of effluents by chlorine or ozone seems to give the greatest promise.

It is clear then, from what has been said, that there are a number of methods of sewage disposal, including preliminary and final treatment, by which it is possible to secure an effluent having almost any desired purity. The question as to *what standard* shall be demanded in any case can only be arrived at after the most careful study of local conditions with respect to stream flow, and of the dangers of infection resulting from a subsequent use of the water. The question as to *which of the methods* of disposal will be most appropriate in any case will depend not only upon the *standard required,* but upon local conditions, such as those affecting the cost of construction and the relative merits of the various types of plants, in producing an effluent of the required purity.

In conclusion, then, one may say in answer to a hypothetical question, as to what would constitute a modern and complete sewage disposal plant, adequately suited to the requirements of a small community or institution, where a high standard of purification is demanded, that it should, under ordinary conditions, and according to modern engineering practice, comprise the following general features or devices:

First. A combined screening and settling chamber of moderate capacity, provided with screens, for the removal of the coarse or grosser solids from the sewage.

Second. A settling basin or septic tank for the precipitation or transformation of a considerable portion of the organic and mineral suspended matters.

Third. A biological filter of the slow sand or rapid coarse grained type for the oxidation and nitrification of the organic matters remaining in the settled or septic sewage.

Fourth. A small settling basin, into which the effluent from the biological filters is received and sterilized, for the precipitation and destruction of the remaining suspended matters and bacteria.

With an installation of this description, properly designed and constructed, and intelligently operated, we should obtain a sterile effluent of sparkling appearance, and practically free from organic or mineral suspended matters — an effluent suitable to be discharged into any stream, without fear of destroying its æsthetic qualities or of producing a nuisance, or of transmitting disease.

THE LAWS RELATING TO THE POLLUTION OF STREAMS

BY A. H. SEYMOUR, ESQ.

Secretary and Deputy Commissioner, State Department of Health

The matter of the pollution of the waters of this State by the sewage from the cities and villages and wastes from manufacturing establishments is one which is rapidly beginning to assume the important place in people's minds and in the public press which it should have occupied some years ago.

The subject is one which at present occupies a large part of the time and attention of the State Department of Health and in which the health officers are interested and with which they are often called upon to deal. Not only that, but every health officer and physician as well as the intelligent body of citizens in this State are naturally interested in a topic which has such a direct bearing upon the dissemination of disease and the protection of our municipal water supplies.

I shall, therefore, speak to you briefly in a general way, as to the legal aspects of the subject of pollution from a broad standpoint. Having endeavored to make clear to you how the law has dealt with the subject in other States, I shall undertake to describe in as few words as possible what the situation is in the State of New York and how the Department is attempting to enforce our statutes in this regard.

Under the common law, which existed prior to the passage of the multitude of statutes with which every law library is burdened at the present time, certain principles regarding the pollution of streams were laid down and may be said to have been generally followed by the courts in cases of this character.

The principles of the law have been well classified, by a learned writer on this subject, under three heads: "First, the rights of riparian owners to pure water as against one another. Second, the rights of the public (as distinguished from individual owners) to have inland waters kept free from pollution by riparian owners or others. Third, the conditions under which and the extent to which public municipalities may use inland waters for disposing of sewage matter from public sewers." As to the rights of riparian owners, it may be said broadly *that no riparian owner of a stream may pollute the water,* nor may he appropriate all the water, nor diminish the flow of the stream to such an extent that property below him is injured thereby. This was, I believe, firmly established under the common law and may well be said to be the law in this country, except in some of the western States, where the question of mining and of irrigation has rendered other provisions advisable. A riparian owner, of course, has the right to use the water running over his land for domestic purposes, for watering his stock, etc., but he has no right to pollute it to such an extent as to render it unfit for domestic uses by the riparian owners below him. He has no right to put sewage or filth of any kind into the water, which might render it injurious to health. A large number of cases might be cited where these principles have been sustained and where damages have been given by the courts to the injured parties. A few of the western States have partly abrogated the doctrine of riparian rights, as above stated, and have adopted what is known as the doctrine of prior appropriation. This practically supersedes the right of riparian owners and gives the appropriator the right to use the water to such an extent as may be necessary for the purposes for which he has appropriated it.

The public is concerned with the pollution of streams when such a pollution universally affects the health or materially interferes with the peace and comfort of a large and indefinite number

* "A review of the laws forbidding pollution of inland waters in the United States," by Edwin B. Goodell, Department of the Interior U. S. Geological Survey.

of people in a neighborhood. Such pollution then becomes a public nuisance and when such a condition exists, it is the duty of the public authorities to cause its abatement. Only in circumstances of this kind has the public, as such, any rights in the case. In many cases the courts have held the pollution of streams to be public nuisances and I may say that the opinions of the courts in regard to matters of this kind have been generally growing broader and stronger and must of necessity continue to do so, as the population of our country increases and there are more people affected by cases of this character, and, therefore, there is a greater danger and nuisances more frequently result.

It has always been the custom in America for every city or village to discharge its sewage into the nearest stream without regard for the health or comfort of the people below them. It is needless for me to say that the *municipality* has no more right to injuriously pollute a body of water than has a riparian owner. They have the same rights *if* riparian owners and are subject to the same restrictions in the use and treatment of water flowing over their lands. Where a statute expressly authorizes a municipality to discharge sewage into a particular water, its authority is exercised subject to the implied condition that such discharge will not constitute a nuisance. Legislative authority can and has been conferred in a number of cases in this State to acquire the rights of riparian owners by condemnation, but it can, of course, go no further than this, as private property cannot be taken for public uses without just compensation.

Owing to the vast size of our country, the numerous bodies of water and the large and rapidly flowing streams within it, the subject of pollution by municipalities has as yet not received the same attention that it has abroad. England, many years ago, passed a "Rivers Pollution Prevention Act," the population of the country having become so large that a very serious condition of affairs was threatened. The streams of England are neither as large nor as long as our American waters, and the population is nearly ten times as dense as that of the United States. The subject was, therefore, brought forcibly to the attention of the law-making bodies of England. As a result of the passage of laws designed to check pollution, a very large number of the cities and villages in England have established and are conducting to-day sewage disposal plants, and are not allowed to discharge raw sewage into their streams. The subject has also received

considerable attention in France and Germany — the city of Paris operating a sewage disposal plant to relieve the pollution of the waters of the river Seine. These countries are considerably in advance of the United States in their attitude regarding this subject. The rapid increase in population in America is forcing upon the attention of legislators and public health officials the all-importance of preserving the waters as far as possible in their original purity. We can profit by the experience of other countries and deal with this subject in the light of their wisdom.

There is no provision in the Constitution giving Congress any authority over the subject; therefore, the States in the Union exercise within their respective jurisdiction sovereign power with respect to this subject. In my judgment, the time will come when Congress must be given some authority in matters of this kind. Take, for example, the magnificent Susquehanna with its headwaters in the State of New York, which flows across the State of Pennsylvania and into the Chesapeake bay in the State of Maryland. The increase in the population of our cities may render it necessary to use the Susquehanna as a source of potable water supply, and I have understood that it has been contemplated by the city of Baltimore. Were the States of New York and Pennsylvania to allow unlimited pollution of the Susquehanna river within their borders, we may readily conceive that its value as a source of potable water supply by cities below us and in other States might be largely destroyed or at least rendered dangerous. It is true that at present the Commissioners of Health of both New York and Pennsylvania, as a result of a joint agreement made a year ago, are working together to prevent, so far as lies in their power, any further pollution of the Susquehanna, but this is no guaranty that their policy will be carried out by the persons who may in the future be clothed with their authority. In respect to many of our larger lakes and streams it becomes an interstate question and can only be fully controlled by a body having authority over interstate subjects. Had Congress authority in a case of this kind, it could protect a body of water or stream from pollution in all the States it borders upon.

Considerable progress has been made in this country in the last fifty years in the control of pollution. Nearly all our States to-day have some restrictions with regard to pollution, and a very large number of the provisions of the different States make

it a misdemeanor to pollute the waters or to discharge into them certain kinds of refuse. I shall not take the time to enumerate the States which have dealt with the subject, but I might state that, in a "Review of the laws prohibiting pollution of inland waters of the United States," published by the United States Geological Survey, the States are classified as follows: *Seventeen* have partial statute restrictions, and *twenty* have general restrictions in which the importance of pure water for potable and domestic purposes has been recognized by the Legislature. The statutes of the different States of course vary a great deal in their wording and in the restrictions which they place, and only *eight* are classified as having *severe restrictions*, which indicate that these States have adopted stringent methods to prevent the further pollution of the streams. New York is included in this number, and the others are Connecticut, Massachusetts, Minnesota, New Hampshire, New Jersey, Pennsylvania and Vermont. Among these States Massachusetts is unquestionably far in the lead in regard to the work that has been done.

The Massachusetts State Board of Health has for many years had a large appropriation for work of this character, and the reports of their board are considered to-day to be the most valuable of any official documents issued by any State along this line. They have labored to eliminate the pollution particularly where there is danger to the water supply of a municipality, and, as a direct result, a large number of the Massachusetts cities have constructed sewage disposal plants, the operation of which is watched by the board; and they also advise the different municipalities regarding the construction of sewer systems.

The State of New Jersey proposes to carry the sewage matter from its larger cities to tidewater, a method which it is hoped will result in doing away entirely with any nuisance or danger to other municipalities. There has been, however, some criticism to the plan to empty the sewage from a proposed Passaic Valley sewer into the waters of New York harbor, on the ground that a serious pollution of the harbor would result.

Pennsylvania's new Health Department, under the control of Dr. Dixon, the distinguished physician and eminent sanitarian whom you had the pleasure of hearing last year in Syracuse, is doing a vast amount of work to protect its streams from further pollution. He has a large amount of money to work with, and will no doubt adopt and carry out a policy which will result in

being of immense benefit to the State. He not only is required to approve the plans for the construction of every water system in the State or extension to the same, but he also has the authority to order the discontinuance of the discharge of sewage into the waters of the State where, in his judgment, it may become injurious to the public health.

The subject of pollution first received attention in the State of New York in 1885, when the Legislature passed a law providing that the State Board of Health might make rules and regulations for the protection from contamination of potable water supplies within this State. This law, with modification and amendments, is still in force and constitutes sections 70, 71 and 72 of the Public Health Law. Acting under this provision, the State Department of Health has adopted rules and regulations for the sanitary protection of a large number of the potable water supplies of the State and is every year called upon to extend its authority to other places.

These rules and regulations are prepared after a careful examination of the local conditions by an expert engineer. They are then usually submitted to the local authorities for recommendations, and, after careful consideration, are made sufficient to properly safeguard the water supply, and are then published as provided by law. They then have practically the force and effect of law. Under these rules and regulations, violations may be punished and a watershed may be kept clean. The enforcement is, of course, in the hands of the local authorities, and where violations of these rules exist it is due to the negligence of the officials charged with the duty of enforcing them. This act was an important one as providing a means for protecting the water supply of a city and, acting under the authority of these rules, many cities and villages have put their watersheds in ideal condition. Those which have not enforced such rules are being called to account by the Department, and the authorities in charge of the water supply, and the people using the water will have, from time to time, the danger of neglect pointed out to them forcibly.

In 1892 an act was passed which provided that a city or incorporated village, which has made provision for the disposal of its sewage so as not to pollute or contaminate any stream, might maintain an action in the Supreme Court to prevent the discharge of sewage into any water from which it draws its water supply.

There are a number of provisions in the Forest, Fish and Game Laws designed to prevent the pollution of waters to such an extent that fish are destroyed, and there is also a provision of the Penal Code prohibiting the discharge of refuse from gas factories, etc., and other noxious or poisonous substances into any of the public waters.

But the most important provision of our law was the act passed by the Legislature in 1903, constituting at present sections 75 to 79-d of the Public Health Law, as this act vests the State Commissioner of Health with most of his authority over the subject. It provides briefly that no person shall discharge any sewage into the waters of the State unless by permission of the State Commissioner of Health, and that all plans for sewer systems or for extensions or modifications to existing sewer systems must be approved by the State Commissioner of Health, and a permit issued by him for the discharge of sewage. It prohibits the discharge of sewage from factories, etc., without permission from the State Commissioner of Health, and makes it the duty of the public health authorities of every municipality of the State to file a report and map of their sewer system as it existed at the time of the passage of the act. Under this act, when plans are submitted to the Commissioner of Health for approval, he may require the plans of a sewage disposal plant to be submitted, and may refuse to allow the discharge of sewage from such a system until a sewage disposal plant has been constructed. It, therefore, places in his hands very largely the control over *future* pollution of the streams, but the act of course could not prevent the discharge of sewage from sewer systems already in existence at the time of the passage of the act, and this presents a serious question. Unless a city or village desires to extend its sewer system, and the Commissioner of Health requires that they take immediate steps for the construction of a sewage disposal plant, the discharge of sewage from that place may be continued indefinitely unless, of course, a municipality or person below them should secure an injunction restraining them.

You are all, no doubt, aware of the attitude of the present Commissioner regarding the subject of the pollution of streams. In his first address as Commissioner, to the health officers of the State in the Conference of 1905, he called particular attention to the subjects of water supply and sewage pollution to typhoid fever. H facts ar

that typhoid epidemics have been caused by sewage pollution in many of the cities, and that the only safe rule to apply was to eliminate, as far as possible, the danger of sewage pollution. He further said: "It will be the fixed policy of this Department not to grant any permits for the further pollution of our streams by sewage, except for very cogent and absolutely imperative reasons." In every official address since that time he has reiterated this policy of the Department, although pointing out that the whole subject of the pollution of the waters of the State is one which must be considered from a broad viewpoint before any drastic measures are taken.

It is alleged that many municipalities are undoubtedly discharging raw sewage into our streams when such sewage should be treated in a disposal plant, but to demand reform in one instance, without weighing it in relation to others on the same watershed, complicates the problem rather than helps it. It is surely out of place for the citizens of one municipality to demand drastic measures against their neighbors when, at the same time, they are taking no steps themselves to correct an existing abuse. The Department has, therefore, undertaken a proper study of the questions in all their bearings, and with due relationship to all that pertains to them, and it is submitted that this is the only proper policy of a health department, although at times the progress attained may seem to be slow.

With this in mind, and with the very limited appropriation which the Department has for this work, it has undertaken during this year to make an examination of, and to carefully map, the watersheds of the State. All possible information is gathered as to the amount of pollution existing and the demands that may be made on the stream in future as a potable water supply.

After carefully weighing the subject, in all its aspects, a policy is then adopted by the Commissioner, for the Department, to govern its future actions in the granting of permits for the discharge of sewage on this watershed. As a result of this work the Department is in a position to point out positively what should be done in certain parts of the State, and with certain streams, and when plans are submitted to it for approval, it can base its grant of a permit for the discharge of sewage upon a [redacted]h has been given after careful study and a policy [redacted]n fixed after thorough investigation.

I do not believe I am going too far to say that this work should have been done years ago. Had the State had such a policy ten years ago a large amount of the pollution would already have been eliminated. The criticism for not doing this, if any there be, must be upon the Legislature which has failed to provide any funds for the work. The fact that the Department has undertaken this work has brought about one of the natural results which follow any particular line of activity, and that is that constant demands are made upon it to undertake work which it cannot do, and to attempt to remedy conditions with which it has no legal authority to interfere. Enthusiastic, but ignorant, citizens of the State interested in the subject of pollution, whose ideas seem to be that the Commissioner of Health has absolute authority to do anything that he may take a notion to, are constantly writing the Department demanding that he issue orders where he has not a shadow of authority, and that he remedy private wrongs which belong in the civil courts; and one recent communication stated that the people of a certain village were suffering with malarial fever, and asked that the Commissioner of Health issue an order to relieve them. In many of the cases presented it would be just as feasible for the Commissioner to issue an order that on and after a certain date there should be no more smallpox in the State, but in every case where the Department apparently has any authority, or where its advice would be of any assistance, it does and will go as far as its limited means will permit and make such an investigation and such recommendations, or lend such other assistance as is in its power.

Some of the newspapers, with that characteristic inaccuracy and misrepresentation which a few of them so carefully follow in all their comments respecting public officials and public authority generally, have seen fit to criticize the Department for not immediately bringing about an end to the existing conditions in this State regarding the pollution of streams. I am willing to submit to you, gentlemen, as health officers of the State — as the real backbone of the Department of Health — whether the attitude of the Department on this question is correct, and whether its policy is sound. You are frequently called upon to express an opinion in matters of this kind and also to inspect complaints with regard to pollution. I believe it to be a part of your duties, not only as health officers, but as the leading sanitarians of your respective jurisdictions, to discuss these matters when they are

brought up, and to assist in educating your people to the importance and necessity of the preservation of our lakes and streams from pollution, not only as a health measure, but also that future lovers of nature may enjoy our streams as they should be able to. Were this indiscriminate pollution to continue, our fishing, boating and bathing, so dear to every lover of out-of-door life, will be a thing of the past.

The discharge of wastes from mills, particularly pulp mills, dye works, tanneries, etc., presents at once an interesting and a somewhat complex question. Under our law every mill or factory owner must secure permission from the State Commissioner of Health to discharge refuse or waste matter into the waters of the State. In issuing these permits the Department endeavors to restrict the pollution wherever possible, and it issues no permits, except with conditions attached, which permit is revocable at any time. This course is also followed in issuing permits for the discharge of raw sewage from public sewer systems, the effluent from sewage disposal plants, etc., and in this way the operation of these plants is kept under the supervision of the Department to a large extent.

The law further provides that the local board of health shall make and maintain such inspection as will at all times enable it to determine whether the act is complied with in respect to the discharge of sewage, refuse matter from mills, etc., into the waters of the State. Upon discovery of violations of the act it becomes the duty of the local board of health to serve a written notice on the person or corporation responsible for the violation, specifying the violation and fixing the time within which it must cease. If at the expiration of this time the violation continues it is the duty of the local board to report the same to the State Commissioner of Health, who shall give a hearing and take proof of the facts, and if he finds the violation to continue he shall certify that fact to the Board of Health, which shall then bring an action for recovery of the heavy penalties imposed and for an injunction. The penalties for the discharge of sewage from a public sewer system without a permit is $500 and $50 per day for each day the offense is maintained. The penalty for the discharge of sewage from factories without a permit is $100 and $10 per day for each day the offense is maintained.

Local boards of health should see that these provisions of the law are fully enforced. If sewers are being built in your city

or village, by individuals or by public authority, see if the plans have been properly approved by the Department. If factories are constructed, which wish to discharge sewage into the waters of the State, see that they have permits, or stop the work. Wherever possible require the construction of settling tanks in factories, if they use dyes or colors, before permitting them to discharge into your sewer systems, and save complaints on this score.

In other words, do what you can to prevent the further pollution of the waters in your vicinity, and you may be sure that if occasionally you meet some chronic faultfinder who thinks your work unnecessary, that at least future generations will rise up and call you blessed.

Now, just a word as to the future of this problem in New York State. It may be said that all public health legislation is progressive legislation. It took twenty years to secure the passage of the Pure Food Law by Congress, and the progress of legislation along sanitary lines is usually slow, but it may safely be said that, having once committed itself to a policy along an indicated line necessary in the preservation of the public health, the State cannot and will not recede from its position. It is, therefore, only fair to assume that the laws of this State regarding the pollution of streams will not be modified. They may be changed, and probably will be, but the general trend of legislation will be to make them more stringent and to erect more safeguards against the pollution of our waters which will be so badly needed by future generations for potable water supplies, and for the purposes of pleasure and recreation.

I predict that within our lifetime, and certainly within the lifetime of the next generation, such absolute restrictions will be placed by law that there will be no further pollution of our waters to any great extent, but that the cities and villages will be required to construct and operate efficient sewage disposal plants, and that a municipality which proposes to discharge its raw sewage into a stream will be regarded as barbarous.

In the interests of the health of the citizens of this State the State Department of Health proposes to do everything in its power to further the time when such elimination of waste matters will come, and you health officers can do a great service in using your influence with the Legislature to secure adequate appropriations to carry on the work.

It is not a work which can be easily carried to a conclusion, or which should be done too hastily. Sanitary science is progressing by leaps and bounds, but there are still many puzzling questions before us. For instance, the pulp mills in parts of our State have badly polluted some magnificent streams. The question now is, What can be done with pulp mill wastes? and sanitary engineers seem at a loss for a positive answer.

While the mill owners are entitled to consideration, and property rights should not be disturbed without careful study of the questions involved, I feel that property rights should not be given paramount consideration to those of the people. For one, I would be glad to see the pulp mill banished forever from the Adirondacks. Give us back our beautiful streams and forests in their original grandeur, and make these industries seek other fields of action or cease ruining our magnificent play grounds and health resorts.

No subject presents more alluring aspects to officials in public health work than this great question of pollution, and in almost none can he labor with more gratifying satisfaction in the knowledge that he is working, not only for the increase of comfort, health and pleasure of the present generation, but also of those still unborn, whose appreciation of the beauties of mountain, lake and streams will be as deep as our own, and when this mighty State — the greatest in our Union — harbors the immense population it is bound to have, and our water supplies are drawn on to the utmost for the very source of health itself, pure water, will future officials, charged with the responsibility of enforcement of public health laws, stand before audiences and give due credit to those who labored in the past in this great work.

SANITARY INSPECTION OF WELLS AND THEIR SURROUNDINGS

BY MR L. M. WACHTER

Sanitary Chemist, State Hygienic Laboratory

In considering the source of typhoid infection, causing the sporadic cases occurring in our smaller communities, it often seems as though it was taking the course of least resistance to accuse the well.

The other possibilities should first be eliminated, such as the absence of the patient from home ten to twenty-five days prior to the onset of the disease, the eating of raw vegetables or shell-fish, the drinking of milk produced at another place or handled by some one sick or convalescent from a disease that might have been typhoid.

The persistent presence of the typhoid bacillus for long periods of time in some people, who have had the disease, awakens us to possibilities of infection from sources unthought of in the past.

For a well to become infected we must, of course, first have the infecting material, and, secondly, we must have a mode of transmission to the water in the well.

Naturally we at first think of the privy as the source from which the infection is transmitted to the well. This necessitates the supposition of a previous case or a bacilli-carrier depositing discharges into the privy; and, if such discharges are deposited, it is quite as probable that flies are the mode of transmission, for they often carry the infection greater distances than the area drained by a given well. Or they can infect food that may afterward be carried into the home and used.

Our attention is frequently called to instances where there are several cases in one family or on the same premises. Of course it is quite possible that the different cases could have been contracted by drinking the water from the same well; but, if a period for incubation elapses between the first and other cases, it is more probable that there is secondary infection by direct contact or transmission by the mixing of duties, the nursing and the cooking, for example.

The possibilities of infecting the well can be rendered more remote by the generous use of chloride of lime around and in the vault that may have received infected material before the

physician had been called, and the proper disposal of the patient's discharges by disinfection, and burial will reduce this danger to the minimum.

And now let us consider some of the possibilities of polluting wells. The first and greatest possibilities are at the surface. If we will stop a moment and consider the condition of many wells at the surface of the ground we shall readily realize this. If the well is dug, the walls are generally far from water-tight, and usually extend but little above the general surface of the ground and are covered with a leaky platform. Safety and cleanliness would require that at least the upper four feet of the wall be made of concrete or other water-tight material, and that this wall extend a foot or more above the general surface, thus excluding surface wash and seepage.

In the case of a driven well, care should be taken that there is no seepage along the outside of the pipe that can find its way downward toward the water that is supplied from the well.

Surface pollution, though it may not be the means of infecting a well with pathogenic organisms, renders an analysis of the water almost useless and for the following reason:

In routine work the analyst does not attempt to isolate the typhoid bacillus, but makes tests for bacilli of the B. coli type. This species naturally inhabits the intestinal tract; unfortunately not only of man, but also of warm-blooded animals, and here lies the difficulty of interpreting results. One can only say that the water is polluted with matter of fecal origin. This is not necessarily of human origin, and hence need not of necessity be accompanied by typhoid bacilli. If the polluting material reaches the well as surface drainage, it quite likely originates from stable filth. With these possibilities of surface pollution, filthy but not necessarily dangerous, to obscure the results, you can readily see the difficulty of making a correct diagnosis.

The analyst makes mistakes as well as the physician, but ours remain recorded on paper to be flaunted at us in the future, while yours are possibly buried. These mistakes are usually caused by the absence of definite information regarding local conditions.

Frequently we get samples of well water, the chemical analysis of which indicates that the water has been heavily polluted in its past history, but that soil filtration has corrected it. The bacterial analysis of the same water shows that organisms of fecal origin are still present, but this does not tell us if they are from

accidental surface pollution or if they are relics of the past pollution not completely eliminated by the soil filtration, and consequently have reached the well by subsurface drainage.

Let us next take up the possibilities of subsurface pollution of wells and the principal factors that make this pollution possible or aid in its prevention.

The first and most evident factor is the distance that the sources of possible pollution are from the well. The second is the character of the soil or rock intervening between the well and the sources of pollution.

This latter is the more important factor because upon this depends the rate of the movement of the underground water from the source of pollution to the well.

Shale rock, limestone and some other formations are the most undesirable materials, because the water finds its way through fissures and flows at rapid rates, without giving sufficient opportunity for purification by soil filtration. The more compact the soil the less the danger from pollution, because the motion of the underground water is retarded and the slow movement gives opportunities for the necessary purification.

Dr. Thresh, a recognized British authority, in a paper read before the British Association of Water Works Engineers, stated:

"The author is anxiously looking out for the records of any outbreak in which the contaminating matter had to percolate through several feet of compact soil before it reached the incriminated water, but as yet has been unable to find any such record.

"There are many reports on single cases attributed to the use of shallow well water. But in nearly every instance it is stated that sewage could practically run directly into the well, and in the cases where there is no record of the condition of the well or of its immediate surroundings, such defects may have existed and failed to be recorded.

"In very many of these small outbreaks, however, the proof that the disease was due to polluted water is of a most unconvincing character.

"The author has had a great deal of experience in connection with outbreaks of typhoid fever, and has made an especial study of the sporadic cases which occur from time to time in nearly all districts, but has never investigated a single case in which the well water was seriously liable to the suspicion of being the cause, where the well was so placed or constructed that sewage had not more or less direct access.

"He is driven to the conclusion that water, in slowly percolating through a few feet of compact soil, cannot carry with it the

microbe causing typhoid fever. Where water takes days to traverse the subsoil before reaching the well or spring, the typhoid bacillus is either filtered out or loses its life.

"Both filtration and time are undoubtedly important factors in water purification by the action of the soil.

"The more readily and directly the polluting matter can reach the water, the greater the danger, the longer the period which elapses between the polluting matter being deposited on or in the soil and reaching the subsoil water, and the more compact the pervious soil, the smaller the danger.

"Water derived from compact subsoil can, therefore, be readily rendered perfectly safe by the proper construction of the collecting well and by adequate protection of a limited area around the same.

"Where the subsoil is fissured, as occurs in very many formations, unless the fissures are filled with deposits from a more superficial stratum, the risk of pollution of a dangerous character is much more serious. Even if the well is of a great depth or is far from any possible source of pollution, it must be remembered that if pollution gets into an open fissure leading to the well, serious results may follow, even if the contaminating material has to travel a long distance before it reaches the well.

"Here time may be a factor.

"The typhoid and cholera bacilli can only live for a limited time in water; and if these bacilli gain access to the water in these fissures, yet do not reach the well until after a lapse of several days, it is very probable that they have died before entering the well, and will, therefore, be no longer a source of danger.

"Unfortunately, however, circumstances may arise greatly accelerating the rate of flow in the fissures — such as increased pumping, heavy rainfalls, or both — and although under normal conditions the well may be a safe source of supply, under the exceptional conditions it may be a dangerous source."*

Summed up, Dr. Thresh's contentions resolve themselves principally into the element of time. The greatest danger comes from surface pollution because the pathogenic organisms reach the well directly with no length of time intervening to allow antagonizing forces to cause their death. Next in point of danger come fissures in rocks, because they make it possible for the infecting material to quickly enter the well, again preventing time to elapse, the big factor in the fate of the typhoid organism in water.

* *Engineering News*, Vol. 58, No. 5, page 109.

Lastly, compact soil is safe because the water must travel slowly and the typhoid organisms are excluded or die before reaching the well.

Many people have an idea that the more water that is pumped from a well the better the water. This is a fallacy; pure water does not become stagnant, and much pumping lowers the ground water level near the well, and this would increase the rate of flow toward the well and so increases the danger of infection.

This brings up another point, the possibility of infection remaining in a well for years after it was once infected. This is probably not so. If the source of infection is definitely known and removed, and the site thoroughly disinfected with chloride of lime, there seems no reason that the infection in a well should persist for a year or longer.

Our inferences are that causes other than infected wells are more frequently the cause of sporadic cases. Even when a privy has received infected material, flies are quite frequently the medium of transmission and not well water alone, as is generally supposed.

More attention should be paid to the construction of wells at the surface of the ground and the platforms covering them, to make them water-tight and prevent surface pollution, as this is the easiest avenue of access. Wells in rocks containing fissures are particularly dangerous, while compact soil renders the possibility of pollution remote.

When there are opportunities for pollution from barnyard drainage, either at the surface or by percolation, the routine bacteriological water analysis cannot differentiate between fecal pollution from this source and that of human origin which might carry the typhoid bacillus.

If you eliminate the other possibilities as to the probable source of infection, and then wish to have a well examined, send for an outfit from the Department and fill out the circular describing the well and its surroundings, the character of the soil or rocks penetrated, the distances and relative positions of the different factors and any such information that will assist the analyst in forming a mental picture of the physical condition of the well and its environment.

Physicians cannot diagnose disease by telephone, unless they are practitioners of the absent treatment, nor can the analyst interpret the results correctly by intuition. You help yourselves by making it possible for us to give correct interpretations.

FRIDAY, OCTOBER 18, 1907.

FOURTH SESSION, 9:30 A. M.

PRACTICAL POINTS ON QUARANTINE

BY JOHN T. WHEELER, M.D.

Director Division of Communicable Diseases, State Department of Health

Most of us know Dr. Goler of pure milk fame. Those of us who do not know him and who hear him this evening will feel that they do know him. Not all of us know, perhaps, that he is an expert in the first rank on eruptive diseases and particularly in smallpox. I was talking with him some six months ago in Rochester about differentiation between chicken-pox in the adult and smallpox, and the stumbling block it was causing in a good many places in this State to the great discomfort of the profession and injury to the public. About three or four months after that, when I was in my home about 300 miles from Rochester, I was called up on the telephone and the call was from Rochester. The voice was that of Dr. Goler, and this was the message: "I found a case of chicken-pox in the adult." And surely enough after he sent me the photographs of it I agreed that it was a case of chicken-pox in the adult. I would like to have examined this case, as the probabilities are that it is the first case of chicken-pox in the adult I have ever seen, and I hope it will be the last one.

I want to give you the real and practical workings really suited to these conditions for a differentiation between chicken-pox in the adult, and smallpox. There are no doubt those in the audience and many men throughout the State who would give good money if they had known them really before and had a chance to learn this conundrum. It has caused them a great deal of humiliation; caused the State a great deal of expense and started a great many epidemics of smallpox.

Whenever you get a case of an eruptive disease in the adult, and you can figure the diagnosis down so that it stands between chicken-pox on the one hand and smallpox on the other, call it smallpox and you will be right every time. I will go further than that. If you can carry your diagnosis further, if you can throw out smallpox altogether so that you have only chicken-pox

and nothing else, still call it smallpox and you will be pretty nearly right. Also, say that chicken-pox occurs about once a year; well, Dr. Goler has cornered up our one case for this year and we will be safe to call all the rest smallpox.

The Department is rather sore over the way smallpox has been mistaken for chicken-pox in so many places during the past year and allowed to go on and spread until it becomes quite difficult to manage. This poor, mongrel, weak, diluted smallpox, that is smallpox, and that isn't anything else but smallpox, that is breaking out, from the concealing characteristics of the disease, misleads us into thinking that it is only chicken-pox.

Along with the photographs I send around a report of one of these doubtful cases by Dr. Curtis, the dermatologist, and the President of the Medical Society of the State of New York. He is a man whom we must acknowledge as master on all questions concerning the exanthemata. You should read the report carefully as it goes with the photographs, and is in itself an exquisite pen picture of a case of disease, and a fine illustration of diagnostic acumen and poise of judgment. You will see that the doctor kept the case under observation for three or four weeks before he called it smallpox, but observe, moreover, that he had been treating it as smallpox all the while.

When I left Albany there were twenty different places in the State where the disease had been recently reported. Its universal mildness robs it of its traditional horror, and accounts largely for its reckless diffusion by the laity, and accounts also for the difficulty in diagnosis. It is atypical, and misleads men who are looking for the old-fashioned form — both the young doctors who have never had any opportunity to see any smallpox at all, and the old hands who think they know all about it.

But it has held sway for some years now; its characteristics are pretty well defined; and there is no excuse for the profession, and for us who are distinctly sanitarians, to keep on blundering about it. It is smallpox and nothing else. We do not know how soon the type will change; we know that epidemics of widely varying severity have, in times past, followed one another in rapid succession. Human experience does not justify us in treating the disease other than traditionally. The public who know no better may be justified in regarding it with light-minded indifference, and make us a world of trouble in holding them in control; but we who have the history and experience and the training of our profession must not allow ourselves to be misled.

Let me go over something that was printed in the Bulletin six years ago or more. I think that Dr. Curtis must have written it. It is in regard to the differentiation of diagnosis. Note these data to aid you in the diagnosis:

"If an adult: If the initial fever is marked and lasts three days, subsiding as the eruption appears; if the eruption comes first on the face and is the more abundant there; and if there is any induration of the lesion, as of a papule having become vesicular, all of these or any modification of them are quite conclusive of smallpox. No adult should be allowed to be at large with an eruption thought to be that of chicken-pox; no case of vesicular exanthem, proceeded by marked fever, though the fever may have no characteristics differing from that of a severe or mild cold; no vesicular eruption so starting and coming mostly the face, wrists (and frequently on the palms) is likely to be anything but smallpox; and if there is any induration of the base vesicular lesions appreciable to touch with the tip of the finger, both of these are to be held as conclusive symptoms. In every case, give the benefit of doubt to the public, for there will be some cases in which diagnosis will, for a little time, be difficult. Where several cases have occurred the difficulties of diagnosis will be lessened."

That is if there is only one case in the family it may be difficult to diagnose it; but where there are two or more you get a good chance to watch it better.

There are several special points that I want to talk to you about as health officers, that should be of very great interest to you. The one point I want to take up now is, that of the individual report card in cases of communicable diseases, and the significance of this card. We want to be an organization with one object — force of united action and unity. In behalf of the Department I want to thank the very large number of health officers, and the still larger number of physicians who are not health officers, for the thorough way they have sent in their report cards of contagious diseases.

These individual reports are the foundation of the science of epidemiology, the science of the laws which govern widespread diseases.

It takes a little time, it does not signify much to you when you send it; but in the Department as your cards and your neighbor's come in together, collectively they tell the story of the outbreaks of disease.

You may not know that your neighbor up the stream had typhoid before you did, but it is on the cards; and we trace it back up the stream, through one village and another for many miles; perhaps, to its very source on some hillside farm; and your town ultimately gets the benefit of the knowledge. Or, again, from your own observation, you suspect some valuable water supply — which is on many accounts a serious matter. But the broader study of the facts permit us to say, "no," the fever comes from individual carriers, or from flies, and it is a great comfort to find that your costly and trusted water sources are still unpolluted, and the epidemic an easy one to manage.

Last winter the report cards told Boston that a surprisingly large outbreak of scarlet fever had suddenly appeared in one of the city suburbs. There is only one interpretation for such a sudden and violent outbreak. It means milk; and they forthwith traced it down to the very milk handler who furnished the contagion for the entire epidemic, and the epidemic went down as rapidly as it had flashed up, for when they suppressed him they suppressed the entire epidemic.

Several weeks ago we apprised every health officer in Jefferson county that smallpox was coming; a gentleman full of smallpox and whiskey had broken quarantine and was wandering up and down the county. Last summer a negro got loose on the west bank of the Hudson with smallpox, and telegraph communication came to us two days later from Philadelphia reporting that they had him fast in the pesthouse of that city.

See, what a study I have been able to make from the diphtheria records of one town.

In so far as we act together in this way, we are an organism capable of highly developed functions for the good of the whole body politic, but without this vital connection of the report card between the health officer at the periphery and the Department at the center we would be a lifeless aggregation of unrelated parts, of little value to the public.

If we begin this crusade against diphtheria, the report cards will be of inestimable importance. The crusade against tuberculosis is just beginning to take form. Here again it will be the information from the report card which will furnish the basis of operations.

If you want to do something for the good of humanity, and have not done it already, send us in next year a card report of

every case of contagious disease in your municipality. Make the cards in duplicate, and file one away in your card index for reference.

DIPHTHERIA

There are those of us who believe that in respect to the sanitary control of diphtheria through the use of free antitoxin, that the State is not achieving quite all the results that it should. You know that diphtheria is third among the contagious diseases in respect to mortality. It records over 3,000 deaths per year, about double the mortality from typhoid fever. Now the report which comes in to us through the agency of the individual report cards show that we are not making the most of our blessings. The gift of antitoxin has wrought such an amazing change in the mortality of this dreadful scourge that we have been content to accept the gift blindly without stopping to consider how we can use it to the very last extreme of its very beneficent possibilities. Because science has put into our hands a most powerful weapon, even when used clumsily, it looks as though we had never taken the pains to handle it with skill.

There are three ways of wasting antitoxin: One is, to not use it at all when it is at hand and needed. The second is to use it in too small quantities. And the third is to use it in excess of its needs. But as you never know how much toxin there may be at work in the system in any given case, you can never know when you are giving too much of its antidote, and it does not at all matter, because the excess can do no harm. So the last way of wasting it can be left out of account.

I believe that by the organized action of this body of men sitting before me, the annual death rate of diphtheria can be reduced 50 per cent.

That means that we — we men in this room — by our united efforts, by our intelligent scientific use of diptheria antitoxin among the poor, can save enough lives, to almost, if not quite, offset the entire mortality from typhoid fever through the entire State. If antitoxin were free to all classes, the better-to-do as well as the poor, I know we could. I want to enlist this morning an army of crusaders pledged to the mission of knocking out diphtheria in one round. I mean stamping out an epidemic with the first case. We can do this among the poor only, for they are under control; among other classes of society, the cost of the remedy is so great that they neither use it to the best advantage

for themselves or for the public at large. It is an anomalous situation, if you happen to think of it — the poor being better off than the rich, but it is true in this instance. The use of antitoxin in our hands, including as it does, not only its use for the cure of the individual but its sanitary use for the suppression of the epidemic — and the use of the agent pushed with a purpose to the last limit of its curative and sanitary powers, is a pretty important matter. We need to have a good understanding and to lay down certain rules.

(1) Antitoxin must be used in every case of diphtheria. No man is wise enough to foresee a nonfatal issue; but even if we all were, it is not enough that the individual survive. We must arrest the destructive action of the toxin on the cells of the body, which may be very grave in its results even though it stops short of death. Antitoxin does good to every case. It must be used in every case for another reason. It is the shortest and most certain way to get rid of the center of contagion.

(2) Antitoxin must be used at the very earliest possible moment, upon the merest suspicion of the presence of diphtheria, without waiting for a positive diagnosis, either clinical or bacteriological. Rule 2 is imperative. We must act thus promptly because the destructive toxic action advances rapidly, and each twenty-four hours is marked by an alarming increase in the fatality. Delays mean more deaths, more and graver sequelæ. And again, the longer a case is allowed to run, the greater the public risk. This rule will include a particularly dangerous class of cases to the community which are quite commonly overlooked, viz., cases of apparently simple pharyngitis occurring during the diphtheria epidemic. If left untreated, they are a prolific source of infection. Of course under this rule we will often give the serum when it proves later we did not need to do so.

(3) The injections should be repeated every twenty-four hours until an effect is obtained.

(4) Antitoxin must be used in doses so large that they err, if at all, on the side of excess. We do not know how large the quantity of toxin is at work in the system. Sometimes from its overwhelming violence we know that it must be very large. We should never fail to give enough to neutralize the poison. If we give more than enough we have done no harm.

(5) Finally, antitoxin must be used for immunizing purposes on every exposed person. Antitoxin does not destroy the

Klebs-Loeffler bacillus, it is true, and immunized persons may still be carriers of the disease, in their healthy throats; nevertheless, it is the most effectual way known of hedging round the disease. As a rule, every member of the household should be regarded as an exposed person, and a careful inquiry instituted for exposed playmates, next door visitors, particularly servants, etc.

Now, let us put these rules forward for what we may call our ideal treatment of diphtheria, and just to convince you that there is justification for expecting a great improvement if we all pull together, let me give you a specimen of the real actual practice of the last year. I hold in my hand a bunch of report cards. They tell the story of an epidemic in one of our Hudson river towns, no different in any way from twenty others in as many other points in the State. The health officer of this town is a good man; the physicians are quite up to the average. It is an illustrative case.

CHRISTIAN SCIENTISTS

We are liable every now and then to run up against the Christian Scientist, and when it comes to a matter of quarantine, the Christian Scientist with his peculiarities of "beliefs" about smallpox and diphtheria and so on is a hard proposition.

It is just as well to be well prepared in advance when we do encounter them, so we shall have command of the situation. With their beliefs on religion and disease, we have nothing to do except in so far as the latter interfere with the public safety.

Doctors are apt to be a little bit intolerant. It is Mr. Dooley who remarks: "If the Christian Scientist had a little more science, Hinnesey, and the doctors had a little more Christianity, I think with the aid of a good nurse, Hinnesey, a man might get along pretty well."

We will take up a specific case and discuss it:

LETTER FROM A HEALTH OFFICER

EUGENE H. PORTER, M. D., *State Commissioner of Health:*

Dear Doctor:— Herewith I hand you report of cases of diphtheria occurring in Christian Science families in our town as per request of your Department.

Monday, July 8, 1907. People in vicinity reported two cases of sore throat in family of Mr. Blank (Christian Scientist). I immediately investigated and made a diagnosis of diphtheria; quarantined the house and offered to procure medical aid and

give antitoxin. Offer refused. They requested that I allow their healer to pass in and out and treat the cases, which I refused to do. In the meantime the report reaches me that healer had been in and out twice during the day. Investigation proved the report true. Was unable to locate healer. Stationed an officer at house instructing him, if healer went in to keep him within and allow no others to pass in or out. At 7 or 8 o'clock healer went in and is still there. Patients, two girls, one 24 years; one about 10 years. Tuesday or Wednesday, July 9 or 10, mother, Mrs. Blank, became infected and died Sunday, July 14, 1907.

I went to the house, ordered a private funeral and reported case to the coroner who viewed the remains and issued death certificate. Tried to persuade the family again to have physician and to have antitoxin. They refused. Monday, July 15, daughter, 24 years, died. Coroner again looked after the case. Funerals and burials under my supervision July 15, 9:30 a. m. House fumigated. Other patient improving. Up.

Remaining in the house are, one child of 7 years; the father, a man aged 45 to 50 years and healer, man of 45 years, none of which have had the disease and two older girls who have probaly recovered sufficiently to be out of danger.

Medical treatment refused as treatment or prevention again to-day. I intend after strict fumigation to keep strict quarantine until period of incubation has passed.

Kindly advise me as to period and if you deem advisable any other points for me to observe. Respectfully submitted.

The following day the Doctor adds: To-day after discussing the matter with you, I went once more to the residence of these people and requested them to allow me to use antitoxin on the seven-year-old child. After a time, permission was granted, and I gave immunizing doses.

CHRISTIAN SCIENCE

There are some interesting questions involved.

The Christian Scientist undertook at first to let epidemic diphtheria run its natural course without reporting it, or without either medical assistance or antitoxin or quarantine.

Later, he accepts a quarantine but tries to evade it as regards the healer, and refuses antitoxin or other treatment. Two children, one a victim of the disease, and one well, are minors.

What ought to be done in behalf of those two minor children exposed on account of their father's belief to the fate of the mother and older sister?

On this point the law is very explicit: Section 288 of the Penal Code provides, that a person who wilfully omits, without lawful excuse, to perform a duty by law imposed upon him to furnish food, clothing, shelter or medical attendance to a minor, is guilty of a misdemeanor. Furthermore, the violation of the quarantine regulation in letting the healer pass in and out was a misdemeanor. So, too, the healer was a violator of the law in entering the quarantined premises.

But suppose there were no minors involved. Has any one the right, out of deference to a religious belief, to ask to allow so difficult a disease as diphtheria is to control, to run through its natural history with no other protection for the public than a police quarantine of a private residence on a public street. It means an undue prolongation of a center of contagion, and an uncertain degree of isolation. It is certainly a question which a local board would be justified in entertaining, and in acting upon, for the public protection. Any action of a reasonable character looking to that end would be pretty likely to stand.

In this case the intimation of an arrest seems to have been enough. The Christian Scientist could accept the alternative of death for his wife and child, but the alternative of jail was quite too much for himself.

It appears that the law, therefore, does not leave helpless in dealing with these curious religious fanatics, but while we must protect the public against them, and likewise their defenseless minor children, we should take care not to give the impression that we are inspired by a spirit of religious intolerance.

ANTIVACCINATIONISTS

Next after the religious fanatic comes the antivaccinationist crank. He is, as a rule, a personality of small account, but I bring him in for the sake of advising you first, not to take him too seriously, and secondly not to let him interfere too much with the enforcement of the school vaccination requirements. Generally, he is a man who has heard of some one else who has had trouble with vaccination, whose mind lacks scientific training, and who is ignorant of, or who refuses to see in their true perspective the trivialities of vaccination in contrast with the enormities of smallpox. It is a fad for some kinds of fakirs. Just now, there are some to be found among the callow youths who delight to read the Philistine. Here is a specimen from the principal of

an academy. We have several letters from principals of academies:

Mr. Commissioner:— I hope the Department will agitate the question of free antitoxin until it is an accomplished fact. Further, I hope that physicians using it for the first time (and there are many who would be in that class) should receive sufficient instruction relative to its proper administration.

There is much antagonism to vaccination, and I would be glad to receive literature bearing on the subject. I have given the matter quite a little study lately, for I have seen much harm done in its practice, and wish to know more concerning it before I advocate its compulsory practice. Thanking you for any favors, I am,

Yours truly,

.....

To which was responded:

My Dear Sir:— In reply to your communication of August 29, this Department does not furnish controversial literature upon the subject of vaccination for the reason that the proportion of intelligent people who think they are antivaccinationists is so small, that they are a negligible quantity. They are mostly harmless poseurs who do not resist the law, and who, when the actual pestilence of smallpox comes, go and get vaccinated like the rest of us. For a layman who is sincere however, the advice of a physician of experience and good judgment is just as valuable in this as in any other professional matter. You are fortunate in having such a one in Dr. R. of your town. I advise you to consult him.

The Acute Contagious Diseases, Welsh and Chamberg, Lea Bros. & Co., is the best recent authority on smallpox and vaccination, if you wish to read at all, and Elbert Hubbard in the Philistine is a good specimen of the untrustworthy poseur class.

Very sincerely, etc.,

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COMPULSORY VACCINATION

I bring these letters up to insist that you shall not let these gentlemen interfere too much with the law regarding the vaccination of school children. These gentlemen play the role of martyrs over what they call compulsory vaccination. There is no law in this State actually compelling anybody to be vaccinated against his will, but the law attains the end in an indirect way. It prohibits the unvaccinated child from attending school. It is a law mandatory on the school trustees, but there is no penalty

for its nonenforcement and, consequently, is much neglected. It is the duty of a local board of health to take into account a situation like this and to deal with it. The procedure would be something like this: The local board of health would formally call the attention of the school to their neglect to comply with the law, state that the protection of the public against smallpox at this time demanded its compliance, and call upon them to take action before a certain date. Now, if the health board is one which commands respect this notice will commonly suffice, but if for that or some other reason the trustees hold back, the health authorities must proceed to make good. They have at least two courses open before them. If the situation is critical, that is, if smallpox is in town or near by the health board may order the school closed. It should at the same time notify the Education Department that the school has been closed, giving the reason, that the school, by reason of neglect of vaccination, was a source of danger to the community. This will put the school trustees into difficulties with both the public and the State Department, and will pretty certainly bring them to time.

But it may be that the local situations will hardly warrant closing the school. In this event the health board may enforce the performance of the duty by a mandamus. There is no reason why a board should not carry its point, if it sets out. It is brought forward as an inconsistency that a child should be excluded from school under this law, and punished for staying out under the Truancy Law, but make sure that your organization is perfect, that every formality is carefully observed so that if you are going into a contest you can be sure of yourself. The law is thoroughly constitutional and there is no reason why it should not be enforced.

THE MANURE HEAP IN THE LITTLE TOWN

Here is a letter from Fultonville concerning a matter of not so momentous importance as some we have dealt with this week, and yet has a very direct and human appeal. It is written in a fine, trembling hand by the clerk of the board. I fancy he is a very nice old gentleman whom we would all like to know. He writes:

To the Officers of the State Board of Health:

Dear Sirs: — There is no contagious disease at the present time. We have had three mild cases of scarlet fever this year. They all recovered. On account of there being no sewer system,

we have some trouble in getting closets, and cesspools, cleaned or moved when complained of. We have a case on hand at the present time that seems difficult for us to decide.

At the rear of a hotel is a sort of a court yard about 100 feet square. There are three stables, each one having a huge heap of horse manure that has not been cleared away this year. A saloon-keeper adjoining this stable, who maintains no stable, complained to the Board, claiming the smell from those heaps to be offensive to him. Notices have been served on the parties, but they have been disregarded.

Although not being a menace to public health, it seems to us to be an offense against public decency. It has two driveways leading to it and can be seen from the street. The parties defy us, claiming the right to maintain them. The hotel-keeper allowed slaughtering in his barn until we stopped him, and it is claimed that he has offal buried in his manure pile which he refuses to remove.

What I wish to know is whether we have any authority in the matter, or is it a matter for the village trustee?

Hoping to hear from you and get your opinion in regard to it, I remain,

Yours respectfully,

THOMAS M. FOODY,
Secretary of the Local Board

P. S.— This is a question whether or not manure heaps can be deemed a nuisance in an incorporated village, a few feet from the main street.

To which there was this response:

July 25, 1907

Mr. THOMAS M. FOODY, *Secretary Board of Health, Fultonville, N. Y.:*

Dear Sir: — In reply to your inquiry of July 24th, notwithstanding that there is no contagious disease in Fultonville, a year-old manure heap in the center of the village and near a public street is a potential source of disease.

With what we now know of flies, common flies, as carriers of disease, any breeding place of these insects is a nuisance, and should be forthwith removed.

Any health board which fails to enforce a regulation removing such a nuisance, will fail of its duty to the community, and any community which fails to support its health officials in an undertaking of this kind must be singularly lacking in public spirit. Go ahead. You have the power and the machinery. Act in due

onformity to law, but act. If you make mistake, you will not e personally liable.

Very respectfully,
Eugene H. Porter, M. D.

The manure heap in the little town has always been a disputable nuisance, but with the increase of dignity which now ttached to the common fly as a carrier of disease, the birthplace f the insect becomes an object of interest.

Fultonville, with its three cases of scarlet fever, all mild, for s record up to August, is to be congratulated, but a case of yphoid fever or of dysentery in that hotel which insists on maintaining" its manure heap might sadly spoil the record.

Fultonville has another lesson for us of very general application. That is the small amount of efficiency a health board has vithout a healthy public sentiment behind it, and the very large powers a board will find itself to possess when once it makes up its mind to exercise them.

Permanent Immunity from Smallpox

I come back to one subject which is very commonplace, and about which nothing new can be said, and yet it is one of an importance which has always been immense and which is equally so now.

Don't let the present mild epidemic of smallpox switch you off from the track that the great preponderance of the population must be kept immune from smallpox by vaccination, so as to have ever present, when the old-fashioned, severe smallpox comes, a barrier of immunity so broad and so high that we may laugh the pestilence to scorn.

It does us all good once in a while, lest we forget, to recall enough of the history of smallpox to appreciate its immense significance in the era before vaccination, and the exactly coequal importance of vaccination from that day to this, and from this day on through all time, so far as we can foresee.

Think of smallpox in that eighteenth century. The most terrible of all the ministers of death, as Macauley called it; a universal disease, in every land and every clime; a perpetual disease; epidemic every three to five years — as often as enough children should accumulate to furnish fuel for the fire. A children's disease because it allowed no one to grow up without getting it, just as measles is, the adult population consisting of survivors only. Every mother, who looked down on her new-born

babe, knew in her heart that it was one chance in three that it would die of smallpox before the year's end, and an even chance before it grew to five. Four hundred thousand died yearly of it throughout Europe.

When Cortez brought it to the virgin soil of Mexico it was estimated that 3,500,000 natives perished from it in one year. Let me give you the history of Boston alone:

Year.	Population.	Cases.	Deaths.
1721	11,000	6,000	850
1730	15,000	4,000	500
1751	.....	7,500	545
1792	20,000	8,346	....

In this last year of 1792 there was 10,655 of the population who had had it already. Eight hundred ran away, leaving a remainder of 221 who escaped the disease.

Well, have the times changed? In only one particular. The pandemic of 1875 was about the worst in the history of the world for extent and fatality. Boston of 1875, or Boston of to-day, would fare the same as Boston of 1792; Mexico would repeat its history but for the great boon of vaccination. The barrier which protects civilization must be a permanent one. We can't wait for the epidemic to come. It would surprise and overwhelm us. We must go out to meet it. Always, in season and out of season, we must religiously and persistently, in the face of indifference and opposition, keep up our vaccination. The school provides us the way. The children must go to school. They may not go without vaccination. School boards are ignorant; they are indifferent; so is the community at large. But we are not ignorant; we must not be indifferent. It is our duty. Let us make it always an observed routine duty.

One thing more: That is the risk of septic infection through careless technique at the time of the operation and through failure to protect the sore during its course.

DISCUSSION

Dr. YOUNG.— I would like to ask a question in regard to the School Law. They won't let a child come to school unless he is vaccinated; parents refuse to have him vaccinated, and he is sent home. Then the truant officer comes after him and forces him to go to school. What are you going to do about it? There is a conflict in the law.

Dr. TOTMAN.— I would like to answer that I would send something stronger than a truant officer after the parents. That is the only way you can answer that question. If there was any trouble I would send an officer after the parents.

THE DETECTION OF COMMUNICABLE DISEASES IN SCHOOL AS A PART OF MEDICAL SCHOOL INSPECTION

BY H. D. SCHMID, M.D.

President Board of Health, White Plains, N. Y.

This is the title proposed to me for a paper to be read at this meeting by your esteemed chief. I accepted the proposition with great pleasure, because I have for many years labored for the welfare of the community in which I live as president of the boards both of education and health.

I know we medical men are very apt to shirk all responsibilities outside of our professional work, which is altogether wrong. Physicians have duties toward the State just as other men. I have always taken for my example, as a citizen, the late lamented Prof. Virchow, the greatest pathologist that ever lived. The most industrious of scientific workers, he yet found time to take most active part in the political life of his country. But he always labored in that department in which his scientific knowledge would make him of most value.

Where, I ask you then, could we medical men find ourselves of more use to the Commonwealth than in the educational fields, and especially in furthering that great object connected therewith, School Hygiene?

The State's life depends on the evolution of our free public schools. A higher and higher state of education alone is a surety of the perpetuation of the free institutions under which we live. And a higher and higher educational development cannot be thought of without a more and more perfect teaching and enforcement of *hygienic* laws. To neglect the hygienic condition of the pupils is to neglect their mental growth and impair their future civic virtues. Civic virtues! This word always makes me swerve for a moment from whatever I may be considering and deliver myself of a few words on the most important of all — "*obedience to the laws.*". Have you ever thought of the terrible fact that we are the most unlimited law-breakers in the world? We make no end of laws, and when they do not suit us, we break them without the slightest hesitation. In my several official capacities, when I considered it my duty to enforce obedience to

laws, I've been met with utmost opposition and been esteemed a personal enemy. Whence arises this moral defect? I am perfectly sure it comes from the lamentable lack of enforcing obedience at home and in the school — and lawless children make lawless citizens.

Unfortunately many of our people confound liberty with license — think it's *manly* in a *boy* to be uncontrollable and irreverent to his elders — and liberty loving in a *man* when he breaks an inconvenient law. Gentlemen! If there be a bad law, enforce it, and by so doing you will also force its repeal; but while it is in force, keep it. Pardon this digression!

School Hygiene, then, is a matter of vast importance. "*Mens sana in corpore sano*" is as true to-day as when it was first uttered. The preservation of health is a mighty factor in building up character.

It seems to me, therefore, much needed that all teachers should be instructed in this weighty science of School Hygiene before they take charge of a class of children. I believe, however, that the curriculum of normal schools does not include it in its many items. I have for this reason made it known in our district that I will give all our public school teachers a course of instruction in it this winter. I trust that many of my hearers will take steps at their respective homes to follow my example, and thereby impress the school authorities with the weightiness of this matter.

We outsiders may look for the children's health in the best possible manner; we may erect perfect palaces of schools; may see that the classrooms, the pupils' seats, etc., are planned according to the most minute demands of School Hygiene, and all this will give little benefit to the little ones if the teacher does not pay heed to the laws of hygiene, partly from indifference, perhaps more likely from ignorance. I appreciate the fact that the teacher should be competent; that is, have the knowledge to recognize in his school life all nonhygienic conditions, and to have the desire to see them abrogated in the interest of the children intrusted to his care, which, however, cannot be accomplished unless he knows himself means and ways guaranteeing to his pupils the best possible condition of perfect health.

I think we are very apt to forget entirely, or perhaps never bear in mind, that it must often be a precarious matter to let the young child begin school life. And why? Because we take it from a life of unbounded freedom to one where he is shut up for

hours in oftentimes a stuffy and ill-ventilated room, with perhaps too many children for the size of this room, and they perhaps unsufficiently clean, and where by the strict rules his nervous system may receive rude shocks as also by probable undesirable companions from wretched homes. The teacher should be able to recognize these conditions and how they may at first depress the young child's state of health, and thereby make it more easily receptive of disease germs. Above this, however, the teacher should be able to comprehend the psychological condition of the pupils, and, if so, will become what I call an "ideal teacher," *i. e.*, one who treats pupils as individuals and not as a class. There is much to be said about contortions of the spine by sitting in false attitudes, and other cognate points, but such cannot enter into this paper, whose great subject after all is the detection of communicable diseases.

The importance of medical school inspection in co-operation with teachers willing to aid in every way cannot be too highly estimated in many directions, and pointedly, I think, in the detection of communicable diseases. It is of such magnitude that in Hungary, for example, the school physician, appointed by government, devotes his entire time to the welfare of the school. How far distant are we yet from this advanced position!

Therefore, when this opportunity of speaking to you was given to me, I determined at once to call to your mind that by the great power vested in the health boards, you can, as health officers, with your boards, do a large part of the work, which would naturally belong to medical school inspectors, without reference to the boards of education, who are often composed of men slow to appreciate the advances made in hygienic endeavors for the public weal. You are, no doubt, well aware how some people still exist (and not always the most illiterate) who are violently opposed to vaccination. This becomes known especially in connection with the law, which compels school attendance, and at the same time forbids children to attend school unless they have been properly vaccinated. It seems to make no difference in the minds of these opponents when you bring to them ceaseless examples of the blessing it has conferred on communities and nations. Most prominent of all is to me the very great success health reforms have produced in the old German city, Augsburg, formerly often almost decimated by epidemics of typhoid, cholera and smallpox, whereas now these have been entirely stamped out.

Very instructive I have found the statement referring to another European city, that tuberculosis in the time from 1876 to 1903 has furnished fewer deaths than ever before, but that this does not include those of school age, meaning, of course, the young, from five to fifteen years, during which the decrease of the number of deaths has not kept even with the rest of the years, nor has grown larger, and has outnumbered those from all other illnesses, as, for example, diphtheria, whooping cough, measles, dysentery, scarlet fever and typhoid. What does such a fact show? Plainly that the source of infection is not only the home, but also the school, and not only the pupils, but also the teacher. Of course, this is doubtless of less magnitude in this country than in Europe, and less in country districts than in large cities.

It always makes me sad when I see how the poor little ones in the tenement-houses of our big city of New York have to live in horribly stuffy narrow quarters and get fresh air only on the sidewalks. It shows, however, how this terrible disease, tuberculosis, comes as much under medical supervision in schools as the more prominently communicable diseases. It goes without saying, that the school, because it assembles children from different homes and brings them into close contact, becomes under certain conditions a medium for the spread of infectious and contagious diseases. The recent better knowledge of the specific cause and propagation of such diseases imposes a still greater duty upon school authorities to exercise every care and precaution, and aid the health authorities in all ways in their endeavors to prevent the school from becoming an agent in the spread of diseases.

I noticed some time ago that in Chicago, I think in 1905, of 75,000 pupils, 4,539 were temporarily excluded from school on account of danger from contagion, which produced a very notable decrease in the mortality from infectious diseases, especially diphtheria and scarlet fever. By the way, I think it an important thing never to speak to the laity of scarlatina, the Latin name of scarlet fever, but always of scarlet fever, because with the majority the name of scarlatina has no significance at all. Unfortunately our school laws allow the employment of a physician only for vaccinating purposes, at least this is all that school boards attempt to do in the vast majority of schools outside the large cities.

Therefore, a large field is left for the interference of health boards. Fortunately, the power invested in them, as I mentioned

above, is so extensive, so sweeping, that it requires mainly the energetic exercise of this power to supply as much as possible medical supervision school boards have failed or were not empowered to provide.

But in order to do such work effectively, the health board and the teachers should work together, and I will show further on the way of it.

It is with delight then that I found how in 1897, the city of New York appointed 134 physicians to visit the schools, which number later on was increased to 150, and no doubt is still larger at the present time. In 1899, the Board of Education of Chicago appointed fifty medical inspectors. In Boston that has been done since 1894. In Paterson, N. J., it exists since 1900; in Minneapolis since 1901; in Detroit since 1902.

When I was president of the board of education and of that of health, I could supply in a measure the absence of a regularly appointed, all-round school physician by having a resolution passed to empower me to call in the services of a properly qualified physician whenever there arose special need. If a case of any contagious disease occurring in a child was reported, a physician was employed to examine all the children of the class which the sick one had attended. If any of them appeared in the least suspicious they were at once excluded from school, directed to have the family physician called in, and were not admitted to school again until they brought a certificate of perfect health from their medical attendant. By this simple means a number of times the outbreak of an epidemic was prevented.

My idea regarding the plan which would work in any community where a school physician is not regularly appointed, or, if appointed, is not devoting his whole time to the school, I will herewith describe to you.

First of all, every new pupil entering school should be examined and at that time it is of special importance to make all possible inquiries regarding tuberculosis. In France, in certain schools all pupils must be examined every three months for tuberculosis, and cards are put up in all the rooms suggesting methods of preventing the terrible disease. All tuberculous pupils and teachers are excluded. Then all vaccination certificates and scars should be examined, and in doubtful cases revaccination demanded. Then to secure the effective co-operation of all intelligent teachers, cards or little leaflets should be furnished to them containing

instruction as to the detection of a number of the communicable diseases. If some false alarms are made it matters not, for this will be on the safe side for the school. It is better to make a mistake now and then than to leave a single infected child in the midst of the well ones. On these leaflets will appear the following short description of diseases.

First. Diphtheria.— Does the child complain of or has it sore throat, with or without a chill? Is it irritable or does it show nervousness by the trembling of the hands when writing, and does it appear somewhat feverish? The teacher finding this at once reports to the school physician or health officer. If it prove diphtheria, all the rest of the children of the same family must be excluded from school and none are readmitted without a medical certificate. And this readmission should not be granted until three weeks after perfect recovery, for the bacillus is often found several weeks in the throat after apparently perfect recovery. If culture tests prove total absence, the child is readmitted, but in the mildest cases ten days ought to be allowed to escape.

Second. Scarlet Fever.— It is impossible to see much about it till vomiting, sore throat and fever have set in. The rash appears later, and in mild cases all the symptoms are not much in evidence. Send the child home to stay there for at least six weeks. All children from the same house must also be excluded for one month, for they may have the disease in a very mild form, and, you know, from the mildest case a very severe one may be acquired.

Teachers will bear in mind that this disease occurs mostly in fall and winter and less in summer; also that if a child a week after exposure shows no symptoms of having taken it, it most likely will not do so at all.

Third. Measles.— A very contagious disease. It breaks out in from seven to twenty-one days after exposure, though I saw once a case that succumbed twenty-eight days afterward.

Unlike scarlet fever, the contagion of it is soon dissipated. It is most virulent in spring and least so in autumn. A child should be excluded for four weeks, and also the other children of the same household. As a general thing people do not consider it of enough importance, and yet the fact that it predisposes to pulmonary diseases makes it dangerous.

Medical certificates, however, are not needed because its contagion dissipates so soon.

If an epidemic exists, look for children complaining of headache, pain in back, dullness.

It is far more dangerous in infants than in older children.

Fourth. Whooping Cough.— Mainly known by the convulsive cough. If an epidemic exists, watch for a very persistent cough, even if no whoop accompanies it. Exclude the afflicted for two months. (Many physicians do nothing for this disease, which I consider a grave mistake.)

Fifth. Mumps.— Easily recognized by the seat of the swelling. Exclude children for ten days after disappearance of the swelling.

Sixth. Chicken-Pox.— Little vesicular eruptions without special disturbance of the system. Exclude children for three weeks after the appearance of the first symptoms.

Seventh. Contagious Conjunctivitis.— The linings of the eyeballs and lids are red. There is a discharge, first watery, then mucous, then yellow and sticky from mucous and pus; the eyelids glue together. Exclude all sick ones till well. After having been sent home, the balustrades, desks, seats, door-knobs and other parts of the door handled must be washed with an antiseptic solution.

Eighth.— All skin eruptions must be referred for examination to the physician.

Ninth. Chorea.— Should be excluded, for it will be acquired by imitation.

A thermometer should be given each teacher. The teachers provided with these leaflets, giving hints as to the detection of the diseases just read, shall be required to notify at once the medical school inspector, if there be such official, or the health officer of the district, if no school inspector exists, whose duty it shall then be to make an examination of all the children of the class in which a contagious disease has been discovered, and to send all, even mere suspects, home for further observation by the family attendant, by whose health certificate alone they can be readmitted.

I think when these diseases break out in a boarding school, the pupils should not be allowed to go home until the attending physician has decided that they cannot carry the infection with them.

I have said nothing about typhoid fever because this would go beyond the power of observation of a nonmedical person. But it gives me the chance of impressing upon you the importance of

your inspection of the milk supply, because in milk we find so often the seeds of illness induced in the consumer. And since it enters so largely in the diet of children of school age, it is proper that in the prevention of typhoid fever especially it should be spoken of. It will astonish you when I tell you that in the German Empire alone more than $425,000,000 worth of it is consumed yearly. Its supervision is of vast importance, and I am convinced that this should begin at the stables, and it would be of immense benefit if in each village and city the sale of all the milk came through some great central establishment, and not through any number of smaller dealers, because one central establishment can be watched and guarded hygienically far better and easier than a number of small sales places where much neglect can be practiced.

Gentlemen! All hygienic measures are the therapeutics of preventive medicine — the great medical goal of the future. And since the future of our great Republic rests with the generations to come, and since it lies in our hands to make them better and better prepared for their great tasks, let us be up and doing. The intelligent physician par excellence is the *true* guide in all that concerns the proper development of our children.

And do not forget that amongst them are the untold numbers born of newly-arrived immigrants, often, alas! of the most undesirable "off-fall" of European nations — full of ignorance, steeped in filth, foreign to every hygienic principle, and yet, by birthright, citizens of this great Republic.

Then let us all strive to be such guides, preparing all these millions of budding citizens for direct and indirect self-preservation, for parenthood, for citizenship and the miscellaneous experiences of life.

Dr. TOTMAN — I think I can say truly that we have listened to a great paper. I did not know much about what I was introducing when I gave the gentleman's name, but I know more about Dr. Schmid now after having heard him.

I am going to introduce to you the gentleman who will present the next paper by telling you that yesterday I got in touch with him. I was going to take the ride to Niagara Falls and was going to view the nice scenery and get a good deal of instruction from the scenery. I came in touch with this gentleman and before I knew it, I was in Niagara Falls and I had my head full of a good deal of important matter on the very subject that Dr. Harlan P. Cole is to present.

HE PREVALENCE OF PHYSICAL DEFECTS IN SCHOOL CHILDREN

BY DR. HARLAN P. COLE

Consulting Orthopedist, State Department of Health

I am a little bit embarrassed by this introduction but hope I may not tirely disappoint all of you — the gentlemen who attended the banquet it evening heard a very good introduction to my paper in the remarks of last speaker to the effect that if you wish to conserve the health of adult, you must begin with the child. The Church tells us — give us child and you may have the adults. It has been aptly said that "the y is the father of the man." Again — "As the twig is bent the tree is lined."

The Conferences are conducted for the devising and executing of plans the prevention of disease. One of the best means of avoiding disease the developing of a symmetrical, healthy body.

Orthopedic — technically defined — means right child. A child cannot be ht if anything about him is wrong. If one thing about a child is wrong ry other part is in some measure affected or disturbed thereby.

I would not attempt in any way, or to any degree, to divert your atten- n from the importance of the consideration of communicable or infectious ease, but to remind you that if the soil on which these German germs, risian parasites, or Hibernian microbes fall, is in proper condition to dis- e of them and prevent their development, we have established at least means of preventing the spread of disease.

If all the members of the body are capable of performing all their func- ns, the owner of that body will be less liable to become a public bene- ary.

The amount of attention which is being given to the examina- n and supervision of the children in the schools of the State of ew York renders it unnecessary for me to say much regarding e importance of the subject. I can most heartily indorse all forts in this direction, not only as a right, but as a duty of the ate, that each coming citizen may be better able to meet the ities of life and be less liable to become a public beneficiary.

In most families the regular attending physician has had occa- n to become acquainted with the liabilities and weaknesses of s flock, and attends to them; but in these days of the Oste- athist who seldom looks beyond the "dislocated vertebra," and e Scientist who believes that God is love and all is well, slight ysical deviations are liable to be overlooked and many a child ay go on into life having already laid the foundation of a diffi- lty that would make life a burden and a successful career an possibility. But the large majority of those who attend the blic schools come from families where on account of numbers d the need of all available ones to contribute to the general

fund, the slight departures and difficulties, and often the greater ones, are sadly overlooked or neglected.

As the body requires the full performance of all of its functions in order that it shall be self-sustaining, it follows that the loss or impairment of any of them subtracts so much from the physical perfection. But it does not end here, for as no organ is entirely independent of the others, the whole body may thus be disturbed. As the loss of a nail from the horse-shoe eventually led to the loss of both horse and rider, so the maladjustment of the teeth may, through imperfect mastication and digestion, cause defective nutrition and lowered vitality, as will also a wasting of the nerve forces through continued eye-strain, an adherent prepuce or an irritable rectum.

It is a well-known fact that the continuous, judicious and systematic use of the lungs by properly trained singers and elocutionists tends to better nutrition and better circulation; and that the homes for consumptives do not contain many delegates from these ranks. The delicate, quiet children who do not speak loud or play games, but sit long hours in a stuffy room curled up in a large chair, reading large books, usually develop a depressed sternum, flattened chest and a contracted lung.

If the expanded and developed lung of the singer avoids consumption, certainly the depressed and flattened chest of the quiet, playless child, that prohibits lung development, lays a very broad foundation for the disease. Children are continually warned against putting their arms over their heads, whereas that position is the most favorable for the free expansion of the lungs, for the ribs are thus raised by the pectoral muscles, giving the chest cavity the greatest possible antero-posterior diameter and removing all weight from the upper part of the lung. The use of a spirometer, if carefully supervised, and not used for competitive test, might be of value in the schools; but the regularly conducted singing exercise, carefully followed, would be of great assistance in expanding the chest and bringing a greater quantity of new air to the top of the lungs. It seems to me that too much cannot be said regarding the conformation of the upper part of the chest and the position occupied by the child during school hours; for whatever may be done to prevent tubercular infection, all must at some time become exposed to it to a certain degree, but if the lungs be in good rugged condition and frequently swept by a large volume of new air, the probability of lodgment and development of germs will be greatly diminished.

Anything that tends to a depression of the chin, a backward clination of the top of the chest and a forward projection of the domen proportionately flattens the upper chest wall and makes more conical. Nearly all consumptives have receding shoul-rs, protruding chins and a capital A-shaped chests.

If we could convert the shape of the chest to a V, instead of A, toward which the habits of inactivity tend, the immunity)m consumption would, I am sure, be much greater, for the rection of the bronchi tends to send the air to the bottom of the ngs rather than to the top. It is a well-known fact that the ctor, who for self-protection slumps into the well-cushioned seat side a stuffy carriage, even though it be perfectly aseptic, is shorter life and more ills than the one who is outside and does own driving.

The great question of the day is the question of vitality and ility, general and local. The one is dependent on the other d the other on the one. Like the two sides of a partnership, e buyer cannot progress without an equal activity on the part the seller, and the seller cannot have the goods if the buyer es not produce them. The body cannot move if it has not the ality or power, and the other side of the simile is more accentu-ed in this case, for we cannot get the power from outside, but e compelled to develop it within our own bodies by our very tivity. An idle member is a weak one, and an entirely useless e goes on to total destruction; therefore, our development pro-esses symmetrically with our mobility and the use of it, and our terioration with anything that in any way interferes with our ssibilities. The prefix *de* in the word defects does not infer imply but positively declares a subtraction, a lack of or loss some faculty or portion of it that should exist in the scale of rfection, and renders the individual not only less able to com-te with others in the life race, but leaves him the more liable to e development of other weaknesses on account of limited tivity.

Much is said and done about physical culture, and it seems that the more recent moves are in the direction of more variety d intensity rather than discrimination. In a recent issue of e of the daily papers of New York city appeared a letter more an two columns in length from the assistant director of physical aining in the city schools. The whole paper, while perfectly and in all its statements, deals entirely with the question of

laxity of appreciation and execution of all that is included in the general plan of physical development. In a recent lecture by a celebrated teacher from Harvard University, before a society for physical culture, about the same idea was carried out. In neither case was any mention made of the possibility that there might be something in the way of the mechanical ability of the child to carry out the prescribed directions; and nothing of the gradual, insidious, unobserved oncoming of a local weakness that is disguised in its earlier stage by some adjustment of the weight-bearing forces until two, three or even five years later, when, after some apparently trifling illness, it suddenly appears a well-developed deformity. To illustrate:

A young lady of fifteen in a well-to-do family was recently brought to my office on account of the following condition:

One hip was noticeably higher and larger than the other; there was an abrupt concavity at the side just above the higher hip, as compared to the opposite side; a continued dull aching at the top of the shoulders, aching in feet and legs, especially on the inner side; she tires quickly, can walk but little; spine slightly but noticeably curved, one shoulder more prominent.

"All this has appeared within two months" is the statement of patient and physician, directly following a mild malarial attack.

The condition has undoubtedly been developing during the past three or four years, but was masked by adjustment until the attack of malaria which weakened the power of adjustment enough to allow the deviation to show. In this case, as in many others, no evidence of any weakness or local disease could be found above the feet, but here there was a decided tendency to pronation, much greater in one than the other. The weaker foot revolved inward on its long axis, allowing the inner side of the foot to come nearer to the floor, thus letting down the leg which rests on the inner row of bones and dropping that hip. This is a picture of but one of many similar conditions that begin early in life, but are not noticed, as it might and should be.

But looking more specifically at the title of my paper, let me quote some remarks from those who have given some study to the subject. In a recent issue of the Journal of the New York State Medical Society appeared a paper on pronated foot, containing the remark, "The prevalence of weakened conditions of the foot in modern life is astounding, and undoubtedly the beginning of that condition is made in early life. * * * The majority of

cases do not come for treatment during the early stages of simple pronation. The cases are either unrecognized or neglected and so are allowed to develop into a more advanced, weakened condition, in which the discomfort to the patient becomes so pronounced as to demand attention. Any one doubting the frequence of pronated foot should stand in front of any public school at closing time and watch the feet of the children as they come out."

Dr. Dearholt of Milwaukee, in a paper entitled "Static Foot Disorder," says:

"The work has been in a special department of surgery and in a department which has apparently little interest for the general practitioner. It has seemed to me, therefore, that I could succeed best in this paper by confining my entire effort to an attempt to stimulate an interest in the minds of practitioners toward a series of conditions that my experience has led me to believe are almost entirely misunderstood.

"Considerable confusion has arisen from the application of names founded on an anatomical basis for conditions which are in reality physiological. I am thinking particularly of the name flatfoot, which is commonly used to denote a symptom-complex which is not necessarily due to flattening of the arch, but may on the contrary be found in many conditions. For this reason I have chosen the broad title Static Foot Disorder, as affording an opportunity for covering all possible errors in weight-bearing not primarily due to congenital or acquired faulty structure."

Dr. Gillette of St. Paul, in a paper entitled "Some Orthopedic Conditions Causing Sciatica," says the following:

"Sometime prior to reading a certain article, I had found a number of conditions which caused sciatica. For instance, several cases of severe flatfoot, after the arch was restored, were relieved of the sciatica. One can readily understand how this might be possible, for from a sudden breaking down of the arch of the foot there must be a great deal of irritation of the plantar nerves. One very severe case of sciatica was cured after a proper shoe was adjusted to relieve a Morton's foot, which is, as you know, a pinching of the external plantar nerve between the ends of the bones, or to pressure of the metatarsals or other digital nerves. This case was proved, beyond a doubt, to be sciatica, due to the pinching of the metatarsal nerves, for after a year or two she returned again suffering from sciatica as she had discarded the wide-toed shoe and was again wearing the fashionable pointed toes. Readjusting proper shoes again relieved for the second time the sciatica.

"One year ago this winter a school girl suffered from pain, seemingly beginning at the heel and extending up the leg to the thigh muscles. This girl was wearing a short shoe and had as a result a post-calcaneal bursitis, sometimes called a painful heel or achillodynia. Her sciatica pain was entirely relieved by a longer shoe and by splitting the heel of the shoe in the middle line behind, and setting in a loose piece of leather between the separated edges."

Dr. Frischbier of New York, in a paper entitled "Pes Planus from the Viewpoint of Neurology," states as follows:

"The relatively large number of cases coming to the clinic of Prof. Collins at the New York Post-Graduate Hospital for the relief of pains in various parts of the body, in whom after careful examination flatfoot or weakfoot is found as the sole attributable source of such pain, has led me to believe that the discussion of this subject might be profitable.

"Although the pain of flatfoot is usually of the feet and legs, it may be of any part of the body, for I have seen improvements of flatfoot in most instances followed by a cessation, or at least amelioration of aches and pains in remote parts. From an analysis of 125 cases, I feel justified in regarding congenital or acquired weak and flatfoot a source of irritation capable of causing widely-scattered pains and discomfort to a degree of depression and exhaustion in particularly susceptible subjects. In all cases and all degrees of flatfoot we naturally expect to find local pain or tenderness about the foot, ankle or leg and these sensory disturbances frequently are not commensurate with the development of deformity, so that in the beginning destruction of the joint, long before any noticeable change of outline, the pains are apt to be the most severe and continuous. Quite frequently also the pains appear localized at first about the knee or hip joints, and later travel downward to concentrate themselves about the member at fault. In 56 cases pains extended to the thighs; in 47 there was great pain in buttocks and lumbar region; in 39 the pain was first felt in hips, thighs (anteriorly) and inguinal region; in 34 cases there was backache up to the shoulder blades; in 21 extreme general irritation, followed by depression; in 17 there was pain in back, also right or left arm; in 4 cases there were restlessness, insomnia, pains worse at night in opposition to the general rule that resting relieves pain.

"The dysesthesias were variously described as pressure constriction, numbness, dull ache, or pains of shooting, stabbing, pulling or throbbing character. The extremely ingenious method of taking an impression of the feet upon specially prepared paper

r means of the ferrocyanide of iron reaction having failed so ten to reveal deformity, simply because of the insidious joint ange residing only in the upper parts, we must rely upon the llowing:

" 1. Other causes being excluded, increase of pain on active and ssive manipulation of the joint, on standing particularly, on alking, jumping; tenderness on pressure over some or all the ny prominences, as the scaphoid, metatarsal heads, os calcis, c., and impaired mobility of the ankle joint somewhat impend- g adduction, limiting extension, and causing a feeling of con- riction or weakness of the joint, point to weakfoot, beginning ıtfoot.

" 2. More advanced cases present greater prominence of the in- rnal malleolus and astragalus, with corresponding depression or adual effacement of the fibular landmarks. Weakness is more onounced at the inner side of the foot and ankle; there are rain and ache of these parts and the calves. Coldness, numb- ss, hyperidrosis, all aggravated by atmospheric changes, are ticed. Discomfort and tire after short walks necessitate fre- ıent rests, during which the joint components partially reposit emselves in the normal order, shortly after again to be jarred ıd jounced, and stretched apart, so as to cause renewed and creased torture. The patients become more or less awkward in eir gait, watch their footing more in order to avoid rough or ıeven places (cobblestone pavements, ruts, obstacles), feel less cure on their feet, use their heels more than their toes and wear vay the inner side of the sole of the shoe.

" 3. When the deformity has become evident the gait and sta- on may change to an actual wobbling, limping or staggering, and ight efforts of the pedal extremity may require such an excess penditure of energy and force as to tempt the patient to re- ain inactive, or at least to save locomotion. As above men- oned, the pains usually are not so severe in this stage, being placed by a transient dull ache."

It is not necessary for me to occupy your time with any ex- nded remarks about any of the glaring deformities, for these e readily recognized, and the title of my paper limits me to fects.

The one particular point I wish to make is that these defects e, as was stated in one of my quotations, seldom anatomical, ıt almost invariably physiological; that is, they are functional their development and dependent on either a limitation or rest of function, and not primarily dependent on a structural ange. It may be brought about by an interference with or

arrest of motion at the point where the defect is recognized, or by lack of balance of power in the weight-bearing parts of the body.

As the bony framework is so adjusted that the axis of one weight-bearing bone is never in direct line with that of its next neighbor, the weight is never passed directly from one bone to another, but the bone below receives it at an angle. This direction of the force tends to push the lower bone to one side, which tendency is only resisted by the muscles, for the ligaments are so attached as to admit of that motion if occasion requires it.

The four curves in the spine, the forward tilting of the pelvis, bringing the weight line of the spine in front of the acetabulum; the forward inclination of the femur and backward inclination of the tibia, and the inward rolling of the foot at each step, all beyond the power of voluntary action to prevent, and all necessary to prevent concussion of the brain or the fracture of our bones unless they were double their present size and strength; all testify to the fact that position is maintained by balance of muscle power; that diminution of general muscle power in general will result in a more pronounced anterior curve in the lumbar vertebræ, adding to the pot-bellied appearance of weakly children the weak knees and the exaggerated inward rolling of the feet, called flat, weak or pronated foot.

In case of lack of balance of power in the two sides of the body or in the two sides of the spine or of one leg, there will be a departure in the direction of the weakness and an immediate attempt at adjustment. This adjustment is easy in the beginning, as it is easy to walk on a side hill for a time, but the departure, like the fork in the road, is slight at first but grows gradually wider, requiring progressively more accommodation, until some slight illness destroys the power of accommodation and an actual deformity is suddenly presented.

Strains often fail to recover after good treatment because the disposition of the foot to roll at each step produces repeated strain at the joint. The foot may do well until brought into use, when it will immediately begin to redevelop a part of its former soreness. The resulting inflammation will deposit plastic lymph among the tendons and ligaments, thus increasing the size of the joint and limiting its motion, and we soon discover that the muscles which should move this joint are becoming atrophied from lack of use. A splint or brace, or the adoption of any position that limits the use of any joint, will result in the same degeneration in proportion to the amount of the cause.

I have said so much about the defects of the weight-bearing parts of the body because they are insidious; are much more frequent; are seldom located at the point of cause; are usually brought about by adjustment of parts to support weight; the initial departure is most frequent at the ankle, and progressively less as we ascend; one defect usually results in another, and the secondary is liable to be treated for the primary; and they can usually be remedied by assistance and almost never by force, but are almost always increased by force.

All parts of the body are liable to defects from local injury, local inflammation, prolonged maintenance of one position, surgical dressings or surgical operations, splints, bandages, braces, plaster-casts, tenotomy and tendon transplanting, and paralysis.

One of the writers from whom I quoted wrote his paper for the purpose of stimulating more interest in the general profession on this subject. My object is a similar one; let us promote that object by referring the defective children, as we find them in the schools, to their physicians for supervision and readjustment in the early stages of any departure.

The pianist trains his fingers, the dancer his toes, the gymnast his whole body. The pianist develops what is called a neuritis of any part of the arm or neck, particularly in the ulnar nerve, by strain or drag upon the cervical nerves. The dancer, gymnast, the teacher of physical culture, doctor, nurse, waiter, floor walker, postman, policeman, porter, school teacher, or any other person who stands much or who is heavy will develop a pronation of the foot called flatfoot or broken arch, which will produce deviations or pains anywhere above, even to the neck; neuritis, knock-knee, bow legs and backache.

The child develops his postural difficulties through lack of balance of power due to rapid growth, imperfect convalescence from some of the children's diseases — polio-myelitis or cerebral disease. None of these conditions will improve under any form of physical culture because their condition and position prohibits the execution. Children are scolded for assuming positions that it is impossible for them to prevent, taught motions they cannot carry out, and braced at points and in ways that they should not be. Correction of adjustment must first be accomplished and that will usually have to begin at the foot.

THE DETECTION OF DEFECTS OF THE EYE, EAR, NOSE AND THROAT

BY DR. H. D. SCHENCK

Consulting Ophthalmologist, State Department of Health

At this conference last year the necessity for the examination of the eyes and ears of school children was presented. This showed that, with the exception of a few of its largest cities, New York State was much behind many of its neighbors in the important matter of properly equipping our school children for the most effective work.

The last United States Census enumerated more than 20,000,000 school children and school property valued at more than $700,000,000. Of these children there are in this State many hundreds of thousands whose capacity for seeing, hearing and properly breathing has not been determined. Many of these, unless the defect is early ascertained and corrected, are kept back in their school work, and subjected to mortification and discouragement because of their inability to keep up with their grade. They are the cog in the great machine of present day education, which is defective, putting the plant in poor working condition and entailing extra efforts on the part of teachers and pupils to make these defective wheels do their work. Many times the task is too heavy and they have to be dropped out. Many of them continue to work with this great handicap of unknown physical defect until they have seriously undermined their nervous system and stunted their physical development beyond repair, because of this extra tension put upon them by defects of sight or hearing, which can be easily detected and corrected.

The criminal classes are largely recruited from the uneducated, who drop out of school because their parents are either ignorant, careless or helpless in regard to having defects of their eyes, ears or nasal apparatus corrected, so that they may easily keep along in school. About every truant (about 98 per cent.) in the city of New York is in some way physically defective, as are 95 per cent. of those backward in their school work. Mind this and listen to these figures. In all our institutions for the feeble-minded brilliant cures are being made by correcting the simplest physical defects in the teeth, nose, digestive system and even in some

cases by curing an obstinate skin affection. Gelpe found 72 per cent. of physically and mentally defective children to have defective eyes and the worse the mental condition the worse were the eyes. If such children can be improved is it not an imperative duty to not only prevent others from getting into this condition but to help these defectives to greater things?

With over one-third of our school children having defects of the eye and more than another third with defects of either the ear, nose or throat (between 70 per cent. and 80 per cent. of the total) it would seem that there could be no possibility of any one, with these facts before them, failing to at once appreciate the necessity for a method being introduced that would ascertain what these defects were and would present a practical method for correcting them.

The number of communications which were received regarding the time and manner of such an examination from all parts of the State, together with the interest manifested by the members of the Conference last year, made the Department determine to take steps to institute an examination on the lines then outlined.

This follows the plan of most of the cities where such examinations are held, as well as our sister States, of having the examination of the pupils of each class made by its teacher. For this year it was determined that the plan had better be tried only in the incorporated villages. First, because very little money was available for the work, and, secondly, because the schools could be more effectively and easily managed in the villages, where most of them have a principal and usually a group of two or more teachers. Public sentiment too in these communities would be more likely to make the examinations successful and we could secure the co-operation and support of boards of education where greater interest would be shown than in the country.

There must be a distinct demand and public sentiment for such examinations before they are taken up in the country schools where the single teacher employed is oftentimes only making the position a stepping stone to some other occupation. With the indifference of such teachers and the failure of many of the trustees to appreciate the advantages of these tests there will be much troublesome apathy and opposition to overcome. The number of villages sent us by the Department of Education was 447. In 397 the boards of education and the number of teachers were

given. In fifty no officers were noted. There are 4,181 teachers in these 397 villages, an average of over ten per village, with a probable average of between thirty-five and forty pupils to a teacher; a total probably of nearly 60,000 pupils to be examined.

The Department of Education furnished the heads of the boards of education in the villages with a number of teachers and the probable enrollment in each room. That Department will also have its institute conductors give the teachers practical instructions in these tests and aid in arousing public sentiment to the necessity for these examinations whenever the institutes are held.

At the end of this paper is appended a list of the villages which have been selected for this year's examination. The boards of education or other authorities in all these towns have been sent sets of cards for testing the vision of the children at twenty feet and for the amplitude of accommodation (illustrating these sets). The following letter was addressed to these boards when the cards were issued:

To the President of the Board of Education:

The last census shows that there are 20,000,000 school children in the United States. The results of the examination in many cities and towns show over 7,000,000 have some defect of one or both eyes and over 7,000,000 more to suffer some defects of the nose, throat or ear, which greatly impedes their progress in school — that is, more than 75 per cent. of our school children suffer from some defect of the eye, ear, nose or throat.

In view of this statement which is a quotation from the report of the sixth annual conference of sanitary officers issued by this Department, and because of the recent widespread agitation in regard to the subject of defective eyesight and hearing of children in schools, we are making an endeavor to ascertain the facts in regard to the eyesight and hearing of the school children of this State as is done in some of the more progressive States.

Under separate cover the Department is sending to you material for the purpose of testing the eyesight and hearing of the children in your schools, and we earnestly request you to give this subject not only your careful attention, but also your sympathetic and interested co-operation.

The instructions to teachers are sufficiently explicit to enable even the unskilled to make the test, and if this test be made under the interested direction of the principal or superintendent, there can be no question of the value of the results.

This examination is made, as you will note, without instruments of any kind and the tests are perfectly harmless and pain-

less. The suggestion should be made to the teachers not to touch the child during the examination, and not to coerce any child whose parents object to having the examination made. All clashing with parental authority should be avoided if possible.

Sometime during the week beginning October 14th should be set aside for this examination, and each teacher should be able to examine at least six pupils per hour. This will enable you to have the report from your schools returned to the Department by October 20th.

Bespeaking for this movement, which will mean so much to the coming generations in your community, your hearty and cordial co-operation, I am,

Very respectfully yours,
EUGENE H. PORTER,
Commissioner of Health."

With the test cards were also sent the following instructions for the teachers to make the examinations:

1. Children under 7 years need not be examined.

2. Children wearing glasses should be tested with their glasses properly adjusted to their faces.

3. Children should be examined singly and privately.

4. Ascertain whether the child habitually suffers from inflamed lids or eyes or after study has weariness or pain in eyes or head or is suffering from squint (eyes crossed).

5. Find whether the vision is normal by the large charts. Do not expose the charts except when they are in use as familiarity leads to memorizing the letters.

6. The chart should have a good side illumination and not be hung in range of a window which will dazzle the eyes. It should be on a level with the head and at a measured distance of twenty feet from the child who should sit facing it. Examine each eye separately by holding a card or other screen close in front of one eye while the other is examined, but do not have the test made with one eye closed by pressure or otherwise. Test the right eye first by having the letters named in order from the top downward. For the left eye have the letters named from right to left to avoid repetition from memory.

7. Where the child cannot name the individual letters, although able to read, the chart of figures may be used. It may also be used as a control test. If the child does not know figures or letters, use the chart of inverted E's, asking the child to tell by a move-

ment of the hand the side on which there is an opening in the E's in the different lines, *i. e.*, up, down, right or left.

8. If it is suspected that the answers are being made from memory, a hole about one and one-half inches may be cut in a narrow strip of cardboard so as to allow only one or two letters to show through the hole, and by skipping around rapidly it is easy to break up the memorizing of the letters.

9. The lines on the three large charts are numbered 200, 100, 70, 50, 40, 30, 20. These indicate the distance the respective letters should be read by the normal eye. The record is made by a fraction, of which the numerator represents the distance of the chart from the child, and the denominator the lowest line he can correctly read. Thus if at 20 feet he reads the lowest line the vision is 20/20, or normal. If he only reads the line above, the vision is 20/30, or 2/3, the normal. If he cannot read the largest letter he must go *slowly* toward the chart until he can. The distance he is from the chart when he can read the largest letter will be the numerator and 200 the denominator. Thus, if he could not tell the letter until he is 10 feet from the chart, his vision will be 10/200, or 1/20, the normal.

10. The eyes should also be tested at the near point and separately as with the large chart, the scholar being seated with his back toward the light and with the small chart well lighted. Begin at eighteen inches and steadily bring the chart nearer and nearer while the scholar continues to read aloud. When he can read no further, measure the distance from his eye to the chart. If the child has difficulty in reading the chart, he can spell the words, and the test will be determined by his failure to pronounce the letters correctly.

11. The fractions 20/20, 20/40, 10/200, etc., will record the distant vision (20 feet) of each eye. Reads, right eye, —— inches up to —— inches; reads, left eye, —— inches up to —— inches, will record the focusing power of each eye; as, R. E. = 16 up to 4 in.; L. E. = 15 up to 3½ in.

EARS

1. All children should be examined.
2. Children should be examined singly and privately.
3. Ascertain whether the child has frequent earaches, has pus or a foul odor proceeding from either ear, suffers from frequent "colds in the head," is subject to a constant catarrhal discharge from the nose or throat or is a mouth-breather.

4. Seat the child facing you near one end of a quiet room, with the windows *closed,* and begin the test of the hearing at a *measured* distance of twenty-five feet. The test is made by having the left ear tightly closed with the finger while you observe the ability of the child to repeat your *moderate* whispers of numbers between 21 and 99, inclusive, avoiding those with cyphers, as 75, 55, 37, 22, etc. Test the left ear with the right tightly closed. Avoid having a wall behind you to act as a sounding-board. The figures should have as nearly equal emphasis as possible, and the distance at which the child correctly repeats a series of three numbers gives his hearing distance for that ear. No further test is necessary if the child hears the numbers perfectly with each ear. If this test shows a slight defect of either ear, further tests may be made by observing how the child hears the tick of an ordinary watch, which should be heard normally at a distance of not less than three feet.

5. The hearing is recorded by a fraction, of which the numerator represents the distance you are from the child and the denominator is 25. If he repeats the numbers correctly at 25 feet his hearing in 25/25, or normal. If he only repeats the numbers correctly when you are at 20 feet, it is 20/25, or 4/5, the normal, and at 12 feet, 12/25, etc.

CARDS AND REPORTS

1. These examinations should be made annually in October, and after the midwinter examinations in the case of new pupils.

2. All the charts should be kept, without rolling or being folded, in a clean, dark place, to prevent the yellowing of the paper.

3. Send at once a properly filled blank to the parent or guardian of all children whose vision is *less* than 20/20 in either eye. Do not fail to report cases where the vision *is* 20/20 if the child is backward in school work, suffers from any abnormal condition of the lids, inflamed eyes, has a discharge from either eye or *frequent headaches.*

Report all cases where the hearing with either ear falls below normal, or the child suffers from any of the conditions mentioned under "Abnormal Conditions — Ears."

4. Mail to the State Department of Health a report, giving the name and age of all children examined. Where the distant vision is 20/20, the focusing power 18 inches up to 4 inches, and there are no abnormal conditions of the eye or lids, or head-

aches; and where the hearing is normal in each ear, without any other abnormal condition, leave the spaces opposite each name vacant.

The vision and hearing are recorded in the proper spaces for each by fractions, as explained above. *All* abnormal conditions of the eyes, lids, ears, nose, throat and headaches are to be recorded by proper abbreviations under the respective headings.

This report must be filed with the Department within ten days.

The report blank which the teacher is instructed to fill, with the name and age of every pupil examined and where there are defects to note them, contains the following headings:

Name.
Age.
Distant vision (20 feet) R. E.; L. E.
Focusing power (inches) R. E.; L. E.
Eyes; Inflam. Disch. Squint.
Lids; Inflam. Scaly, Swollen.
Eyes; Pain, Fatigue after use.
Headache; Daily, Weekly.
Hearing; R. E.; L. E.
Ear; Pain.
Ear; Disch. Odor.
Nose; Colds, Catarrh.
Throat; Mouth-breather.
Cases reported to parents or guardians.
Gen. Health; Remarks.

A number of blanks were furnished for making a report to the parents or guardians of such children as were found to have defects of the eyes or ears, or trouble with catarrh or difficulty in nasal breathing. This blank reads as follows:

eyes
son ears
"An examination of your daughter shows the throat to be de-
ward nose
fective and below the standard required by the State Department of Health. This child cannot do *satisfactory* work in school until this defect is corrected.

You should consult with your family physician or with the health officer of the village as to the choice of an eye or ear doctor whom you advised to consult about the trouble.

"Teacher"

To each health officer in these villages was also sent the following letter:

"Dear Doctor:— The State Department of Health has sent to the public schools of your village the cards, instructions, etc., necessary for having an examination of the eyes and ears of your school children made by the teachers. This examination is to be made during the week beginning October 14th. If you can in any way, as the representative of the Department, aid in having this properly and intelligently done and reports made, we shall be greatly pleased. An examination ought to be made of the eyes to determine where there are any cases of acute conjunctivitis or trachoma. If any are found they should be excluded from the school unless they have proper treatment until the disease is cured. Those where the treatment is such as to take the contagious nature away from the discharge from such eyes may continue in school.

"While the Department desires the health officers to extend every possible aid in carrying out this proposed examination in conjunction with the Education Department, it would suggest that the utmost care and tact be exercised to secure and continue pleasant and harmonious action.

"The function of the health officer would be that of friendly suggestion rather than the exercise of any authority.

Very respectfully,

EUGENE H. PORTER,
Commissioner of Health

The examinations are expected to be held some time during the present week at whatever time the superintendent or board may determine is most convenient. Such an important matter would justify the suspension of school work during the half day that might be necessary, which would then not entail any additional work upon the teacher.

You will note these letters have said that the tests are harmless, painless, no instruments being used and the child is hardly touched during the examination. It was felt by the Department that perhaps some parents might object to the teacher's making this examination. It ought to be clearly understood that the purpose of this examination is only to enable the teachers to inform the parents, on the above-mentioned blank, that the defect exists. It is not, of course, for them to do more than *suggest* treatment.

You will also note that the letter to the boards of education says very distinctly that compulsion or clashing with parental authority should be avoided.

It is very necessary that this be appreciated in order that the working of the examination may be smooth and the best results obtained. The Department feels that the few parents who object will readily fall into line for the next examination, and that they will gladly have their children examined when they find how much benefit has been derived by some neighbor's boy or girl, possibly in the same grade, who has outstripped their child because of the improved equipment he had with the defects of his eyes, ears or nose corrected.

You will note also that the health officers in the town may be consulted by the parent or guardian in regard to getting competent professional advice for a child found defective. This was done for the purpose of giving the child's parents, where there was no family physician, some one in authority to look to for advice.

The great problem in successfully working out this plan will probably be among the very poor who feel unable to go to the expense of getting glasses or having proper treatment for their children. If each of you becomes interested in this work and uses tact and patience with the parents in giving advice, as well as with the educational and other authorities in your town having such matters in charge, this difficulty can be largely met, but tact and caution will have to be used if you would avoid making the whole matter unpopular.

Not only can you be of the greatest service to the Department in tactful work of this kind in individual cases, but your earnest efforts and services are requested in presenting to the educational authorities of your respective villages the advantages that they can secure for every child in the community by having this examination made. Impress upon them that New York State, which is in the van in everything tending to a higher civilization, is behind her sister States in looking after this important detail in the life of our school children.

These uncorrected and unknown defects have trailed along the whole life of many of the present generation. The State protects its minors in their right to property, prevents parents from abusing them, nor will it allow them to starve or squander the estate of their children; neither will the State permit parents to neglect the education of their children, to which the Commonwealth deems

every child entitled. Surely then each community should see to it that these helpless children are given every facility for securing this free education, that it may not wreck them physically or mentally, and, by giving these wards proper equipment, enable them to complete their work so that they will be a credit to the community, of greater value to the State and the moral force, which every truly educated person exerts as a citizen.

Name of Incorporated Village.	President Board of Education.	Number of Teachers.
Adams	G. W. Hannahs	10
Addison	Edward M. Welles	14
Afton	P. A. Hayes, M.D.	7
Akron	I. D. Eckerson	13
Albion	Sanford T. Church	28
Alden	W. H. Bass	5
Alexander	Earl Kidder	4
Alexandria Bay	A. H. Houghton	12
Alfred	C. B. Clarke	9
Allegany	George H. Pierce	....
Altamont	Jesse Crounse	6
Altmar	Byron Heley	4
Amityville	Charles O. Ireland	13
Andes	Thomas W. Miller	5
Andover	Mrs. Addie Coleman	7
Angelica	F. W. Warner	....
Angola	F. E. Blackney	8
Antwerp	G. H. Wood	9
Arcade	Henry J. Beardsley	10
Ardsley	....	....
Argyle	E. H. Snyder	4
Athens	Fred. W. Titus	7
Attica	James G. Donance	12
Aurora	....	....
Avoca	C. J. Harken	6
Avon	E. H. Babcock	8
Babylon	A. J. Woodruff	12
Bainbridge	C. M. Priest	7
Baldwinsville	Jos. F. Williams	22
Ballston Spa	C. O. McCreedy	23
Batavia	Harvey J. Burkhart	52
Bath	Andrew Crook	19
Belfast	W. D. Ault	9
Belleville	Chas. M. Overton	2
Belmont	W. P. Clark	9
Bergen	Herbert S. White	7
Black River	M. M. McGruer	7
Blasdell	W. L. Osborn	6
Bloomingdale	R. P. Towne	4
Bolivar	Geo. E. Wilson	11
Boonville	Garry A. Willard	12
Brewster	James K. Smith	10
Briar Cliff Manor	S. D. Ramson	5
Bridgewater	L. P. Curtis	4
Brockport	....	....
Brocton	B. S. Sweatland	12
Bronxville	....	....
Brookfield	R. E. Rollins	5

Name of Incorporated Village.	President Board of Education.	Number of Teachers.
Brownville	H. G. Stute	10
Burdett	A. Withian	4
Caledonia	F. A. Christie	8
Cambridge	Eliot B. Norton	11
Camden	John M. Young	13
Camillus	Edwin Sebring	6
Canajoharie	Stafford Mosher	14
Canandaigua	John Raines	35
Canaseraga	Walter I. Miller	6
Canastota	David S. Watson	22
Candor	O. J. Ward	7
Canisteo	Harrison Crane	....
Canton	John Bird	19
Cape Vincent	C. A. Collins	7
Carthage	L. D. Thomson	....
Castile	Silas L. Strivings	7
Castleton	....	6
Cato	Edward Kennedy	4
Catskill	Dr. Frank C. Clarke	29
Cattaraugus	Joseph A. Setler	13
Cayuga	Horace S. Wiley	4
Cazenovia	Patrick H. Donnelly	12
Celoron	....	....
Central Square	William Church	5
Champlain	Chas. W. McLellan	6
Charlotte	J. S. Kintz	11
Chateaugay	Merton E. House	11
Chatham	H. L. George	13
Chaumont	Hector Adams	....
Cherry Creek	C. L. Edwards	7
Cherry Valley	Edwin Judd	7
Chester	Chas. W. Kerner	11
Chittenango	Like McHenry	8
Churchville	Dr. C. B. Ireland	7
Clayton	Geo. H. McKinley	14
Clayville	James A. Jordan	6
Cleveland	A. M. Bernhard	6
Clifton Springs	Albert Bosshart, Sr	10
Clinton	L. M. Martin	15
Clyde	George H. Hoyt	15
Cobleskill	L. A. Hodge	13
Cohocton	John C. Mattice	7
Cold Brook	J. W. Moon	9
Cold Spring	James C. Woods	17
Constableville	O. Grant Harrington	....
Cooperstown	Lynn J. Arnold	....
Copenhagen	Fred. A. Green	6
Corfu	H. E. Stevens	6
Corinth	W. C. Randall	14
Cornwall	S. Briggs	10
Coxsackie	Henry A. Jordan	16
Croghan	....	....
Croton-on-Hudson	....	....
Cuba	S. V. Vaughan	11
Dansville	James M. Edwards	14
Dannemora	James H. McCorry	....
Delhi	James R. Honeywell	13
Depew	John H. McCarthy	16
Deposit	E. D. Cumming	14
De Ruyter	M. E. Tallett	6

ɔ of Incorporated Village.	President Board of Education.	Number of Teachers.
.....	H. V. Clark.....	8
ʼerry	Wm. P. Brown.....	....
lle	Howard Spencer	13
.....	.....	....
.....	Geo. E. Goodrich.....	6
.....	Chas. Goble	11
e	Clayton Q. Burch.....	7
ırora	Herbert B. Bissell	17
ındolph	W. E. Searle.....	6
ɔckaway	Alex. Rhame	4
ɔchester	.....	...
ʼracuse	H. E. Richardson.....	20
ɔd	.....	....
ɜ	Cleland Noble	....
.....	J. M. Lewis	5
ɔ	J. Irving Rhodes.....	6
.htown	Albert A. Wheelock.....	5
le	C. D. Divine.....	....
ville	W. G. Laidlaw.....	....
g	.....	...
Heights	Amos Bauman	9
t	.....	....
ce	.....	....
.....	E. H. Knapp.....	5
en	Wm. H. Bailey.....	6
t	J. H. Snow.....	19
ɔ	Walter H. Edson.....	14
ɣdale	.....	....
n	.....	....
ville	Dana H. Wells.....	13
.....	Frank R. Benjamin.....	4
Landing	Benjamin Hammond	16
.....	Harry H. Dockstader.....	8
ɔrt	Wm. P. Sypert	4
lle	Oscar Jewett	....
ın	H. Seymour Vaughn.....	6
ʼvington	Elbert O. Forbes.....	8
lward	A. Dallus Wat.....	24
ain	Dr. Douglas Ayres.....	13
rt	Charles W. Harter.....	....
ɲ	Dr Fred. N Winans.....	6
ɲville	Stanley A. McKay	11
ɜ	Blair F. Simons	22
t	Samuel R. Smith.....	31
ɜ	W. E. Sutfin.....	5
ıip	F. A. McKee.....	13
ille	James A. Burr.....	6
ille	W. F. Young	5
.....	Thos. Langley	3
.....	.....	....
ville	Wm. R. Kinne.....	6
rk	.....	....
alls	James A. Holden.....	51
.....	Joseph Merritt	13
eur	Arthur T. Johnson.....	30
ɲ	Henry L. Moench.....	14
ew-on-Hudson	.....	....
e	Hiram J. Stevens.....	....
.....	J. F. L. Cunningham	9
ɜland	.....	....

Name of Incorporated Village.	President Board of Education.	Number of Teachers.
Greenport	Samuel P. Hedges	21
Greenwich	Dr. Henry Gray	13
Groton	Giles M. Stoddard	...
Hagaman	John T. Moore	3
Hamburg	Dr. B. S. Bourne	15
Hamilton	A. N. Smith	....
Hammond	W. D. Evans	5
Hammondsport	Linn D. Masson	10
Hancock	I. W. Seymour	12
Hannibal	J. R. Chamberlain	6
Harrisville	Dr. D. J. Culver	6
Hastings-on-Hudson	James E. Hogan	12
Haverstraw	Alonzo Wheeler	24
Hempstead	Chas. H. Ludlum	30
Henderson	David Noble	3
Herkimer	Stephen Taylor	36
Hermon	C. E. Mestern	5
Highland Falls	Christopher H. Stark	17
Hilburn	...	....
Hilton	H. S. Cosman	7
Hobart	J. R. Cowan	7
Holland Patent	Ira D. Thomson	7
Holley	M. M. McCrillis	12
Homer	P. C. Kingsbury	16
Honeoye Falls	Benj. R. White	8
Hoosick Falls	Wm. J. Hyland	28
Horseheads	O. J. Bowman	....
Hunter	James Jackson	5
Ilion	Albert H. Sumner	34
Interlaken	E. B. Van Arsdale	5
Irvington	Evan J. Smith, M.D.	22
Jordan	Stephen L. Rockwell	9
Keeseville	William H. Tindale	9
Kenmore	...	....
Kinderhook	William Heeney	5
Lacona	...	....
Lake George	Arthur F. West	6
Lake Placid	L. S. Parkhurst	13
Lakewood	Wm. C. Miller	6
Lancaster	Dr. John G. Miller	10
Larchmont	...	....
La Salle	...	....
Laurens	G. T. Kidder	3
Lawrence	Morris F. Craft	33
Leroy	F. A. Steuben	17
Lestershire	Dr. W. H. Wilson	....
Lewiston	C. N. Hoffman	3
Liberty	James Goodsir	11
Lima	...	2
Limestone	William Paton	6
Lisle	Alonzo D. Lewis	5
Little Valley	Tint Champlin	8
Liverpool	A. B. Randall	8
Livonia	F. M. Davis	9
Lowville	Jay S. Bowen	15
Lyndonville	Chas. E. Fairman	6
Lyons	L. D. Godenbach	23
Lyons Falls	Harry P. Gould	6
McGrawville	Dr. D. E. Ensign	6
Macedon	C. P. Jennings, M.D	5

corporated Village.	President Board of Education.	Number of Teachers.
.....	John Phelps	5
....	Charles S. Hubbard.....	38
.....	Daniel Warren	11
.....	Dr. J. H. Pratt.....	7
.....	Fred. M. Barnum.....	11
.....	.....	...,
.....	E. L. Adams.....	....
.....	Edward Moir	10
.....	J. H. Hitt.....	7
....	Warren C. Grimley.....	6
.....	H. B. Russell.....	6
.....	Frank H. Brett.....	19
.....	Edward S. Childs.....	4
.....	E. J. McConnell.....	9
.....	W. C. Crombie, M.D.....	33
.....	Francis H. Whipple.....	30
.....	David Gallant	4
....	R. H. Baker.....	10
.....	John H. Cornell.....	9
.....	A. G. Sherwood.....	11
.....	Dr. I. S. Edsall.....	6
....	Dr. C. S. Barney.....	6
.....	William E. Smith.....	....
.....	Frank A. Hotchkiss	6
.....	William McCarthy	8
.....	E. M. Plastridge.....	13
.....	F. B. Brooks.....	....
.....	E. Ross Elliott.....	....
.....	A. M. Scriber.....	13
.....	.....	....
.....	R. J. McDowell.....	7
.....	Dr. Chas. Atwood.....	11
.....	E. E. Carpenter.....	8
.....	Frank Gilday	5
.....	Frank D. Babcock.....	5
....	Charles S. Ware.....	10
.....	Dr. F. B. Dodge.....	14
.....	F. W. James.....	10
.....	.....	....
.....	.....	....
.....	Harvey C. Hustis.....	3
.....	Geo. A. Burnham.....	24
.....	Austin Dickerson	9
....	Horatio P. Ball.....	8
.....	Wm. Weatherell	5
.....	Geo. C. Hodges.....	....
.....	.....	....
.....	Benj. L. Ford.....	6
.....	S. H. Latham.....	5
.....	Geo. M. Lundy.....	15
.....	James F. Secor.....	....
.....	Rowland Miles	13
wn	Millard M. DeWitt.....	15
.....	E. G. Palmer.....	7
.....	Geo. W. Ray.....	35
.....	Willis J. Fletcher	12
.....	John A. Dade.....	9
.....	Eugene F. Perry.....	28
.....	A. T. Heckroth.....	7

Name of Incorporated Village.	President Board of Education.	Number of Teachers.
Odessa		....
Oneida Castle	A. S. Galbraith	7
Oneonta	Albert Morris	24
Oramel, sent to town health office	No board of health	....
Oriskany Falls	F. D. Curtis	5
Ossining	Paul M. Pierson	40
Otego	Jerome Ceperley	6
Ovid	Benjamin Franklin	7
Owego	H. Austin Clark	26
Oxford	Jared O. Estelow	11
Painted Post	A. D. Hatch	7
Palatine Bridge	Augustus M. Hodge	4
Palmyra	Edwin B. Anderson	....
Panama	W. L. Eddy	5
Parish	F. B. Foote	....
Patchogue	Geo. D. Gerard	33
Pawling	Geo. A. Daniels	6
Peekskill	Leverett F. Crumb	25
Pelham	James F. Secor	....
Pelham Manor	James F. Secor	....
Penn Yan	John H. Johnson	23
Perry	Charles Wise	18
Phelps	F. H. Wisewell	11
Philadelphia	W. T. Scofield	7
Philmont	John L. Crandell	9
Phœnix	Henry S. Van Wormer	13
Piermont	George M. Williamson	13
Pike	F. H. Lyon	5
Pine Hill		....
Pittsford	Rev. G. H. Gomph	8
Pleasant Valley		..
Pleasantville	Charles D. Hoyt	11
Poland	Milton Howe	5
Port Byron	R. R. Stilwell	9
Port Chester	John W. Diehl	49
Port Dickinson		
Port Henry	C. B. Warner	12
Port Jervis	William A. Parshall	48
Port Leyden	Friend Hoyt	6
Portville	W. E. Wheeler	
Potsdam	F. L. Cubley	
Prattsburg	William G. Dean	7
Prospect		
Pulaski	D. C. Mahaffy	12
Randolph	J. A. Crowley	7
Red Creek	C. O. Peterson	5
Red Hook	Theodore F. Cookingham	5
Remsen	Edward E. Samuel	5
Rhinebeck	Lee Van Vredenburgh	8
Richburg	Levi Hardman	5
Richfield Springs	John D. Cary	12
Richmondville	M. W. Harroway	5
Richville	F. B. Beaman	4
Rifton		
Rockville Center	Frank T. DeLano	
Rosendale		
Rouses Point	John R. Myers	6
Rushville	M. W. Fisher	5
Rye	Theodore Fremd	19

Name of Incorporated Village.	President Board of Education.	Number of Teachers.
Sackett Harbor	John Roblin	6
Sag Harbor	Charles E. Wells, M.D.	17
St. Johnsville	Joseph H. Reaney	12
St. Regis Falls, town of Waverly. No board	M. B. Ramsdell	10
Salamanca	W. K. Harrison	28
Salem	Wm. J. Cruikshank	8
Sandy Creek	Melvin D. Herriman	10
Sandy Hill	Marcus C. Allen	31
Saranac Lake	Isaiah Vosburgh	....
Saratoga Springs	William H. Bennett	10
Saugerties	R. B. Overbagh	17
Savannah	C. A. Coleman	9
Savona	T. C. Wall	6
Schaghticoke	Geo. W. Baldwin	7
Schenevus	M. E. Baldwin	9
Schoharie	Chas. M. Throop	8
Schuylerville	Amos B. Jaquith	10
Scotia	J. L. Hamblet	15
Sea Cliff	Russell Sturgis, 2d	10
Seneca Falls	Jasper N. Hammond	27
Sharon Springs	F. W. La Rue	6
Sherburne	John H. O'Brian	9
Sherman	I. O. Ottaway	9
Sherman Park, to town of Mt. Pleasant, Westchester county	....	....
Shortsville	Oliver S. Titus	7
Sidney	Geo. F. Cosgrave	14
Silver Creek	J. J. Dalrymple	17
Silver Springs	W. B. Powell	7
Sinclairville	A. C. Andrews	6
Skaneateles	F. H. Gregory	12
Sloan	Wm. F. Meadway	7
Smyrna	Geo. P. Pudney	....
Solvay	Geo. J. Schottle	37
Southampton	Walter L. Jagger	14
South Glens Falls	H. B. Parks	11
South Nyack	....	....
Spencer	M. D. Fisher	7
Spencerport	Dr. L. E. Slayton	8
Spring Valley	A. H. Goodhart	17
Springville	Frank O. Smith	17
Stamford	Chas. L. Andrus	11
Stillwater	Geo. B. Lawrence	7
Suffern	R. G. Riggs	15
Tannersville	Chas. L. Thorpe	4
Tarrytown	Frank R. Pierson	30
Theresa	Patrick Kelley	6
Ticonderoga	Frank B. Wickes	23
Tivoli	Henry Miller	5
Trenton	....	....
Trumansburg	Ossian G. Noble	9
Tuckahoe	....	....
Tully	J. T. Crofoot	7
Tupper Lake	Lawrence C. Maid	....
Turin	Geo. W. Allen	4
Unadilla	Chas. C. Flaesch	10
Union	G. F. Sleter	14
Union Springs	Harriet L. Farley	7

Name of Incorporated Village.	President Board of Education.	Number of Teachers.
Unionville	....	....
Upper Nyack	....	....
Valatie	Nathan P. Wild	7
Valley Falls	Dr. T. C. Church	7
Van Etten	B. U. Osborne	5
Vernon	Dr. G. M. Lewis	7
Victor	C. H. Merrill	8
Victory Mills	....	....
Voorheesville	....	....
Waddington	B. S. Crapser	6
Walden	Sanford Abrams	18
Walton	Dr. Wm. B. Morrow	20
Wappingers Falls	Daniel Ashworth	8
Warsaw	John Harrigan	18
Warwick	J. H. Wood	13
Washingtonville	Wm. H. Hallock	....
Waterford	J. Wm. Atkinson	25
Waterloo	Frederick L. Manning	22
Waterville	I. D. Brainard	13
Watkins	O. P. Hurd	14
Waverly	Willard M. Hilton	26
Wayland	W. W. Clark	9
Webster	Thomas Nagle	11
Weedsport	Chas. S. Caywood	10
Wellsburg	Chas. L. Streight	....
Wellsville	W. J. Richardson	....
West Carthage	Reuben Chaufty	8
Westfield	A. B. Ottaway	....
West Haverstraw	John Oldfield	6
West Salamanca	....	....
West Winfield	J. H. Stephens, M.D.	8
Whitehall	Nathan E. Foote	....
White Plains	Edward B. Long	60
Whitesboro	N. G. Waterbury	....
Whitney's Point	Amos M. Johnson	7
Williamsville	N. B. Long	8
Wilson	H. Sanford	11
Windsor	Adrian M. Keyes	6
Wolcott	Willis M. Stone	13
Woodhull	Walter A. Smith	....
Wurtsboro	....	....
Yorkville	....	....
Youngstown	A. H. Dutton	4

FRIDAY, OCTOBER 18, 1907

SEVENTH SESSION, 8 P. M.

SYMPOSIUM ON PURE MILK—WHAT HEALTH DEPARTMENTS CAN DO TO SECURE PURE MILK

DR. LESEUR OF BATAVIA (presiding)

I. BY INSPECTION OF DAIRIES AND FARMS

THOMAS DARLINGTON, M.D.
Health Commissioner of the City of New York

The problem of a pure milk supply for a city is solved when the Department of Health can guarantee that all milk sold within the city limits is drawn from perfectly healthy and normal cows, housed in comfortable and sanitary quarters, milked by a clean and healthy person into a sterile container, quickly cooled, transported and delivered to the consumer in a sealed package.

As the major portion of such a guarantee concerns the health of the cow and the milker, and the sanitary condition of the stable and utensils, the proper place to begin corrective work is at the source, "The Dairy Farm."

From the time when each family kept its own cow or depended for its supply of milk on a local farmer, to the present period, when the big cities depend upon a supply drawn from thousands of dairies scattered over wide areas, is a far cry. This change has come about so insidiously and cities have grown with such astonishing rapidity that it is only recently that the public has awakened to the importance of this vital problem.

The milk supply of New York city consists of 1,750,000 quarts of milk daily, which is gathered from over 35,000 farms and shipped from about 700 creameries, located in six different States.

This great quantity of milk is produced in various sections with a corresponding variety of methods of production. The fact that the farms lay in six States precludes the possibility of uniform supervision by the various local governments.

It is, of course, understood that the Department of Health has no authority outside of the geographical limits of the city, but

our sanitary code provides that "No milk shall be received, held, kept, offered for sale or delivered in the city of New York without a permit from the board of health," and the board can withhold or rescind this permit if unsanitary conditions exist at the dairy or creamery where the milk is produced or handled.

New York city has, therefore, the right to say what pure milk shall be and to forbid entrance to the city of any milk not produced with the proper attention to cleanliness, hygiene and sanitation.

It has been the endeavor of the Department of Health to establish and maintain these conditions as regards the milk supply of New York city; first, by systematic and constant inspection; and second, by preventing the sale of any milk not produced under clean and wholesome conditions.

Rules and regulations for the productions of sanitary milk were issued, and the Country Division of Milk Inspection, consisting of sixteen inspectors, with one inspector in charge, is now in the second year of its work of dairy inspection.

For two years prior to this two experienced inspectors investigated the conditions surrounding the production of our city's milk and brought to light the vast number of abuses that prevented a clean and unpolluted supply. They made preliminary inspections in various creameries, skimming stations and cheese factories that sent their entire or surplus milk or cream to New York. With the establishment of our present dairy division, rules and regulations were sent to every dairyman supplying New York, systematic inspection was inaugurated and the work, steadily advancing, has increased in effectiveness and importance.

A majority of our city milk dealers now incorporate our rules and regulations in the contract they make with the farmers for their milk. Tenants on farms now discuss with the owner before renting what must be done to keep the premises in a sanitary condition, satisfactory to the Department of Health.

During the early part of this work many extremely unsanitary conditions were found. The situation in some instances was beyond hope of correction. A few dairies were closed as the improvements recommended amounted practically to an entire rebuilding of the dairy. No amount of pasteurization could ever make milk produced amid such surroundings fit for human consumption. In fact, pasteurization cannot atone for filth. Preventative measures are better than corrective ones, and whatever opinion may be held as to the relative necessity of pasteurization.

the essential feature of a pure milk supply is that the milk be produced under clean conditions, and that it be kept clean.

The fact that the farmers are without a market for their milk unless they comply with the rules of the Department has been a potent factor in causing them to comply with our orders. The creameries are practically all conforming to our regulations and the dairies and farms are being rapidly put into a sanitary condition.

You have heard considerable of the hardships we are thrusting on the farmer; you have heard of the small producers we are driving out of business, but you will be surprised to learn that out of 35,000 dairies we have been forced to shut out milk from only forty-seven places, and from these for only a short period or until they have changed or improved the condition of their premises.

Our requirements can be summed up in one word, "cleanliness," to comply with which is not necessarily impossible or expensive. Our rules concerning the cows provide that they must be kept clean and that the manure must not be permitted to collect upon the tail, sides, udder and belly. These rules to the clean dairyman would be recognized as essential, but to the filthy dairyman an impossibility and a hardship.

The rules for stables provide that they must have sufficient light and ventilation; floors, walls and ceilings must be clean and tight, the interior whitewashed yearly, and all manure must be removed daily. In the light of investigations, these are necessary to the production of clean milk and can be provided at nominal cost. The removal and immediate utilization of the manure alone would help pay the cost of these changes, and no longer will the huge piles of manure be allowed to accumulate, a menace to good milk and a direct loss to the farmer in the wasted fertilization of the cowyard.

We insist that the water supply must be pure. No dairyman should be allowed to use a supply that is otherwise. Our inspectors have sent in thousands of water samples. The analysis and condemnation of impure supplies have been a lasting benefit to the dairyman in our milk shed and to the milk supply in general.

Our rules provide for a milkhouse to be used exclusively for the handling and storage of milk. This discourages the old practice of straining and keeping the milk in the cow barn where formerly it received its full share of odors, dust and dirt.

Our rules provide that no person having any communicable disease or caring for persons having such disease be allowed to handle the milk or milk utensils, and the hands of the milkers must be carefully washed immediately before milking. How idle to discuss these as hardships when the most elementary knowledge on the part of the dairyman should alone prompt these precautions.

Utensils must be thoroughly cleaned immediately after using and the rinsing of the milk pails in the watering trough will neither suffice nor be tolerated.

Our rules concerning milk provide that it must be free from preservatives and adulterations, it must be quickly cooled to 50 degree F., and must not be drawn from diseased cows.

The matter of testing every herd with the State is primarily a State function. The State should establish a quarantine and prohibit infected cattle from coming into the State; it should test every cow within its borders, should condemn and destroy all diseased cattle and reimburse the owner.

A copy of our Dairy Rules, printed on linen, is posted in over 30,000 cow barns in our milk shed. These rules are encouraging a uniform production and are making filthy and unclean methods the exception. With the dairy rules posted, the next step is to see that they are enforced.

Our sixteen inspectors are each assigned to a district through which they move in a systematic way. They first inspect a creamery and ascertain its sanitary condition; they then inspect all dairies drawing to that station before passing to the next. Each inspection is complete in itself and all of the information obtained is tabulated on cards and mailed to the office in New York. The inspectors average ten inspections a day and with our present force, we cover the entire milk shed once a year.

To qualify men for this work was admittedly a hard task. Dairy inspectors must have a liking for the problem of the farm and must be qualified to give helping suggestions to the dairyman when necessary. A civil service examination excludes those without technical or practical knowledge of the work; then by a course of instruction by experienced inspectors, we have secured a corps of men whose qualifications and judgment fit them for their duties.

One peculiarity of our problem is worth mentioning at this time. Heretofore dairy inspection work was performed largely for the purpose of information and scoring was done in a general

way. The department of health of the city of New York in its new work had the specific duty confronting it of stating plainly to the dairyman what sanitary defects were found, and to plainly outline to him what improvements were essential to render his scoring perfect and his premises sanitary.

To that end we adopted our present score card, with its definite statements, its seventy-five distinct items and its minute and careful scoring. When these reports are sent in, we prepare a letter which we send direct to the farmer, stating what his dairy scores and what improvements are recommended by the inspector.

The effectiveness of this system of dairy inspection is now being proved. Where reinspections have been made we have found uniform improvement. Whitewashing has invariably been done. Window lights and additional ventilation have been installed, milkhouses built, huge piles of manure carted away and the cows groomed and properly cared for. We have caused thousands of privies to be removed to a greater distance from the well, for the habit of farmers to install these two as dangerous neighbors is well known.

Our new requirement that all cases of infectious disease occurring in the households of the dairymen or his help must be reported to us at once has had an educational effect upon the farmer and has made him realize how he can help prevent the spread of milk-borne diseases.

Early in this year, an important addition was made to the sanitary code of the Board of Health. It provides that:

"It shall be the duty of all persons having in their possession bottles, cans or other receptacles containing milk or cream, which are used in the transportation and delivery of milk or cream, to clean or cause to be cleaned immediately upon emptying, and no person shall use or cause or allow to be used any such receptacle for any purpose whatsoever other than the holding of milk or cream, or receive or have in his possession any such receptacle so used or which is unclean or in which milk or cream has been allowed to stand until offensive." This section is simply in line with our constant efforts toward ultimate perfection. And I might say in regard to this section that only last Monday in New York a large number of dealers were fined in the Court of Special Sessions under this one provision alone — the lack of cleanliness of cans and dippers.

The co-operation of the State concerning the cleaning of

utensils in which milk is shipped is encouraging. Our inspectors have witnessed, upon a farm from which the milk is shipped direct, cans returned in such a condition that the farmer and his wife at first sight would flatly refuse to clean them. Sooner or later those cans would be used, and as the means of thoroughly cleaning them on the farm is limited, we can imagine the condition in which they were refilled and shipped back to the city.

Probably the last and best word that has been said on the subject of the control of the milk supply is that embodied in the report of the commission appointed by his honor, George B. McClellan, mayor of New York city, to study and report on the best methods of milk inspection and control. Several of their conclusions are as follows:

First. That milk obtained from a healthy cow is always wholesome, and never a source of danger if it is kept cool and uncontaminated.

Second. In regard to tuberculosis, the report states that the risk of transmitting tuberculosis through milk from cows to man is very slight, unless the disease in the cow is in an advanced form, or is present in the udder. Then this slight risk is considerably lessened when such milk is mixed, as it generally is, with that of healthy cows before it is sold. We believe that this danger has been greatly overestimated in the public mind, and that it can best be met by systematic inspection and condemnation of cows revealing tuberculosis on physical examination.

Third. To secure a good milk supply it is of the first importance to educate the farmers regarding the measures which alone make this result possible, and afterward to see that the rules relating thereto are carried out, since for the most part the contaminating agents which render milk dangerous are introduced at the farms. The production of good milk demands that the farmers be educated so as to secure this result, and also that the proper surveillance be exercised.

Since the system of inspection has been in force, the milk supply in New York city has been materially improved. Granting the premise that I have taken that the function and responsibility of a municipality can be only to furnish to the citizens a supply of pure milk, then the question is simply one of expansion and possibly elaboration of detail. The main and fundamental facts are perfectly clear. Systematic inspection is an absolute necessity, and the maintenance of absolute cleanliness is a *sine qua non*.

II. BY THE PERMIT AND LICENSE SYSTEM

ERNEST WENDE, M.D.

Health Commissioner of Buffalo, N. Y.

No article of food involves greater possibilities of danger to health than milk. It has been the medium of disseminating contagion time and again; of creating a monstrous infant mortality; and the fact is accepted, after ample experimental and pathological investigation, that it is a source of transmitting bovine tuberculosis, particularly in early life.

This, and the fact that milk, with the possible exception of wheat, is the food most universally used, and that it is peculiarly subject to infection, being a culture medium of high order, has necessitated the closest scrutiny and supervision to guard against the possibilities incident to it.

Notwithstanding, safe, pure milk is not yet a general reality, and many features connected with its production are unsatisfactory and dangerous.

A survey of the situation, as it is to-day, shows a condition presenting opportunities for contamination at every step, from production to consumption, but principally at the source where faults, once created, irrevocably remain throughout, entailing, in consequence, an elaborate system of supervision, always open to criticism.

It is pertinent, therefore, to refer briefly to the conditions which contaminate, indicate the lines of improvement and point out the best methods of securing them.

These remarks specially relate to the industry in this section, but indicate a condition which, with minor differences, prevails generally in cities of this class.

Dairies may be arbitrarily classified into three grades.

There are, in this State, a certain number of dairies that fulfill the highest requirements of sanitation, are conducted with a full understanding of the business, and a proper appreciation of its possibilities, and whose sole aim is the production of milk of the purest and best quality. They stand alone, are models of their kind, and some, if not yet commercially successful, are educational and encouraging.

There are others, and a large number, of a second grade, with

which the production of milk is either the sole or most prominent feature, and which, while not fulfilling the standard, recognize the deleterious possibilities and maintain a degree of care and cleanliness that is commendatory.

There remains a third large class, the number of farmers with whom milk is but one of their outputs, and whose sanitation and methods are far from good, frequently bad, to which sanitation does not appeal, which will not obey, and to which the cost of betterment is not justified, and which, even if it were, would not make it. These latter producers are an ever-present menace and danger.

In general, in proportion as the business is the sole production of milk and the herds are large, conditions are better.

The features at the dairy which cause contamination are these:

That animals are not tested, periodically examined or groomed, or provided with suitable environments, or properly milked.

Clean milk cannot be had from dirty animals or from animals cared for in the midst of unsanitary surroundings, dark, dusty, ill-ventilated barns. In the latter — and there are too many of them — dust and dried excreta abounds, while the beasts, themselves contaminated, disseminate contagion with every movement during the milking. So, that from conditions possible with the animals and from their environment, the product, at its very inception, is infected. The subsequent course of the milk subjects it still further to contamination. The farmer's idea of cleanliness not being that of the sanitarian, the cans and utensils, the cooling process and the general procedure all continue the infection.

From the dairy the milk is hauled to the station — one farmer frequently acting as collector for many, or even taking small outputs and mixing them with his own, thus losing the identity of the several products and surely resulting in contamination. After varying periods at station, with exposure to all kinds of weather, in cans open to criticism, it is hauled by rail, without refrigeration, to the city of Buffalo, where it is turned over to the retailer upon whom its future condition depends. He receives the milk within twenty-four hours, at an average temperature of about 50° F., and proceeds to prepare it for the trade, all which involves air and other exposure, manipulation, etc., with accompanying risk.

There are about 400 milk dealers in the city of Buffalo handling approximately 34,000 gallons of milk daily.

The conventional duty of the retail dealer principally consists in removing a certain amount of cream by separator and bottling.

His further duty is to keep the milk refrigerated; to maintain a sanitary condition of milkhouse and cooler; to have scrupulously clean utensils; to follow a system of bottle cleaning that is safe and thorough, and to live up to the city ordinances, especially those relating to contagious disease and adulteration.

In each and every detail a slip may occur, through carelessness or evasion or by intent, with undesirable consequences.

The responsibility of policing the business and protecting the public is placed by the State upon the Department of Agriculture, the city additionally surrounding itself with such safeguards as the situation demands. Owing to the inefficiency of the former the latter has to guard not only against possibilities within its own borders, but from those beyond its jurisdiction.

The State supervision is open to criticism. It is inefficient in that there is no systematic inspection, and that what irregular work is done in this line is upon complaint or hearsay. Even when initial it proves secondary to other work when one area is looked over at a time.

As the city of Buffalo is supplied from many hundreds, if not a thousand, sources, not less than 500 of them being in the ninth district, comprising Erie, Niagara and Orleans counties, the State's surveillance is practically farcical.

Many dairies have never been seen or inspected by the State authorities.

With the exception of instances of contagious disease in animals, where quarantine can be established, there is no procedure for closing an offending dairy without a ten days' notice, during which time milk can continue to be produced and shipped. In these circumstances it is only through co-operation of the city authorities in interdicting the milk that the danger resulting from its possible use is averted.

Examinations of milk are not made as to their bearing upon health, but merely as to its commercial standard.

During the past year only thirty-five samples were examined from the country, of which eleven were fined — 33 per cent. If this percentage of commercial fraud was perpetrated, what attitude would these delinquents be likely to maintain toward cleanliness, particularly if it implied cost, and in the absence of inspection?

Further, no uniform standard is required at the dairies; instead of their coming up to a standard requirement of sanitation and equipment, sanitation is applied to all sorts of equipment and conditions with obvious unsatisfactory results.

The city protects itself in maintaining a record with detailed data of the various supplying dairies — by inspection and by arbitrary interdiction of unsatisfactory milk, from whatever cause, and upon suspicion, pending investigation as to specific gravity, temperature and the like.

It causes examinations to be made on arrival and samples taken for bacterial count. Milkhouses are scrutinized daily as to every particular of sanitation, procedure and bottle washing, and surveillance is exercised over street peddling and house delivery as well as grocery dealers.

An itemized system of recording contagious disease, in connection with each individual milk route, by means of the "tell-tale" register, which is scrutinized daily, shows when any particular route has contagious disease upon it beyond a particular number; the milkman's business is at once investigated and its etiological conditions localized.

Another writer will speak of the epidemics that have been checked in their incipiency through this system.

The bacterial count is the index for official action.

When above 500,000 per cubic centimeter, investigation is instigated.

The writer believes a greater security would be obtained and the public best served if the possibilities were centralized, and sanitary effort was there concentrated.

As liability to contamination is greatest at the source of production, and next with the city dealer, it would appear that with a standard dairy, a system that would eliminate deterioration and contamination beyond it, and a quick delivery, the consumer would get the product as near to nature as possible.

To this end, a radical change would or should obtain, and along these lines is the Department's action exerted.

The Department of Agriculture, as at present constituted, being unequal to the situation, the industry should be placed with a State bureau of dairies, under the State Department of Health, with facilities, powers and equipment, technical and administrative, that the situation demands. The field is so enormous and so intimately connected with the public welfare that the State

is justified in creating a special control, even though it would necessitate large expenditure.

By such bureau the license system should be adopted. No system of control to prevent injury to the public welfare and further sanitation could be so satisfactory. It has demonstrated its efficiency wherever applied, not only in protecting the public, but furthering and improving the interests themselves. While not a contract, it should be given only in consideration of the fulfillment of certain conditions of the sanitation and methods that our present knowledge has demonstrated to be necessary and efficient. The licensing power should be vested with the enforcing authority, and be revocable without notice or hearing when the conditions it is based upon are violated, which should be specified in the license. Many license enactments necessitate "notice and hearing to show cause why" before revocation, which delays procedure and modifies moral effect. It has been suggested that, if feasible, a small bond should be exacted for faithful observance, which is, however, an open question.

The policy of the State, the intent of the enactment, should be to foster the dairy where milk is the sole product, and minimize and, if possible, gradually eliminate, so far as supplying the city is concerned, those with whom its production is a side issue and where high sanitation is not possible. Incidentally, this would entail no great hardship to the latter, for generally that interest is small — an average of eight to ten cows, which are generally kept for their manure, their product about equalizing their cost of keeping in the winter. With this class, their product could go to the manufacturing industries — butter and cheese — where the manipulation and process modifies contaminating possibilities. While it is desired that all dairies be uniform, those supplying the city milk might be specialized, and a high standard demanded and be differentiated from the lesser ones where the product goes in other channels. In other words, grade them and direct their product according to their sanitary standard.

The requirements to operate a dairy under the license system should be based upon the following essentials:

1. Tuberculin test, periodical examinations, and sales to dairies, to be accompanied by veterinarian's certificate of condition.

2. Buildings of concrete or impervious construction, troughs and gutters the same, to prevent absorption and permit flushing.

If the mission of the single-service milk container is limited to supplanting the bottle trade as, at present, existing, its advent means much.

The possibility of infection from bottles will continue so long as they are in service, for, while beyond the control of the milkmen and in possession of the consumer, they are frequently used in domestic service for other purposes, clean and otherwise. The Department of Health of Buffalo has had its attention called to their being used in sick-rooms infected by contagious disease, for "ducks" in nursing, and for various other contaminating offices, all of which is beyond the reach of ordinance or inspection. The paper container precludes the possibility here mentioned.

With the large standard dairy preparing the product for consumer, and the milkman a distributor, there remains the transportation feature; for, at the present time, no protection is afforded, other than the open platform, the bare service car, and terminal sheds; so that much of the expense and effort in cooling at the dairy is offset by its subsequent unprotected journey.

A low bacterial retarding temperature is an essential for milk integrity. Cooled to the proper degree and maintained so, pure, good milk will keep until utilized. The proper transportation of milk requires not only refrigerator cars, but cooling facilities at collecting stations where the product frequently has to wait long periods for train arrivals. Therefore, coolers should be maintained and their efficiency and sanitation be under surveillance. Terminal coolers are not so strongly indicated, inasmuch as removal is immediate upon arrival.

It is, however, important that the wagon haul to distributing points be with full protection from the sun, and it is surprising how efficient a small amount of ice, properly placed under canvas coverings can be made. It is not too much to assume that, with the evolution of the greater advances, the lesser ones will materially grow apace, and the creation of a delivery and hauling wagon adapted and equipped to maintain a low temperature will be in evidence.

The transportation and temperature features being defined, it only remains to bring about uniform action with each link in the chain.

In the absence of steam sterilization, which but few milkmen employ, a cleansing for reuse cannot be expected.

only subsequently upon inspection, and after certain requirements of sanitation and procedure are complied with.

The Department of Health, in addition to having a detailed record of the dairy in all matters pertinent, should maintain a system of official monthly inspectors' reports upon all matters, as may be indicated.

Municipal sanitary officers have no greater ally than the press, so that publicity is their "big stick," since, to the possible delinquent or offender, the fear of it is more dreaded than fines. With this in mind, the periodical publication of the rating of the dairies and city milkhouses for public enlightenment is advisable. This feature can be most admirably utilized in relation to the sanitation of *all* industries depending upon public patronage, especially foods, and their preparation.

Much of the care and protection given milk in its passage to the consumer is neutralized by the conditions to which it is subject after reaching the consumer. This being beyond the direct control of official action, the possibilities can only be met by education, by the diffusion of knowledge among the masses, of all grades, as to the sanitary care of milk and the untoward results of negligence. To this end, I would advocate the labeling of each container in one or more languages, with concise information, the nature of which could be varied, in summer, with special reference to infant and child-feeding. In other words, I would make the paper milk container an educator as well. Reaching, as it would, almost every household, it would daily reiterate the cardinal rules for milk care until they would be indelibly fixed in the mind.

There has been recently introduced the paper paraffine-lined aseptic milk container for single service. The advent of this device eliminates the possibility of the bottle, permits milk to be put up at its source, protects it from contamination in its subsequent course, and tends to simplication of the whole matter. Its general adoption would convert the city milkman from a manipulator to a distributor, and the dairy doing the work for him, the expense of separating, bottling and refrigeration would be eliminated, which, with public enlightenment (and the public has never been so alive to sanitation and the milk question as now), and appreciation that cheap milk means unclean milk, and an advanced price, would increase his profits.

III. BY THE "TELLTALE" MILK REGISTER

HENRY R. HOPKINS, M.D.

Buffalo, N. Y.

What is the milk register and why is it used? The milk register is a clever device for making effective our knowledge, practical and demonstrative, of the frequently fatal facility of milkman's milk becoming the means of transmitting disease.

The milk register presumes that in a given place there has already been found sufficient intelligence upon the part of the law and ordinance-making bodies to provide for the licensing of the milkman, and further assumes that this power of license is honestly and intelligently administered by the health officer of the place. We will further assume that in this place under consideration there are health ordinances and that these ordinances require at the hands of those persons accustomed to treat the sick, the important public duty of promptly reporting to the health authorities all cases of diseases known to be communicable.

Only under these conditions is the milk register possible, and with these conditions assumed as present, we will proceed to introduce the milk register. This device includes a register of the name of each person licensed to sell milk, and these names are placed in a large book like the accountant's ledger, the name standing at the top of the page. The entries, the debits, subsequently made to these several accounts, are made from day to day upon the reports of the doctors announcing that in a given house, upon a given street, there was discovered by the doctor at a given date, a case of typhoid fever, of diphtheria, or of scarlet fever, and that the milk supply of the family was furnished by John Doe.

The interesting work of the milk register begins when upon a single day it is found that John Doe has placed to his discredit much more than his due and proper proportion of one of the above-named diseases — and this work rises to intense and tragic interest when the milk register shows that the two or three items of the first day are followed by four or five like items on the second day — for then as early as the second day the work of the milk register is done, warning has been given, the alarm has been sounded that upon the milk route of the said John Doe there is an incipient epidemic of milk-borne disease.

When, where and by whom was the milk register first used? To the best of my knowledge and belief the milk register is the sole invention of that competent and well-experienced health officer, Dr. Ernest Wende, most fortunately now and for many years commissioner of health of the city of Buffalo, and was first in use in the office of the board of health of our city in the year 1893.

Epidemics of milk-borne diseases reported by the Buffalo Milk Register:

	Cases.
1893, scarlet fever	10
1894, typhoid fever	10
1895, typhoid fever	5
1896, typhoid fever	7
1898, typhoid fever	5
1899, scarlet fever	33
1901, scarlet fever	13
1901, scarlet fever	10
1901, typhoid fever	21
1904, scarlet fever	10
1904, scarlet fever	14
1904, typhoid fever	21
1907, scarlet fever	17
Total epidemics	13
Total cases of disease	176

When had sanitarians the first practical knowledge of the fact of milk-borne diseases? Like most of the real knowledge of the world, our knowledge of milk-borne disease has been of slow growth. Dr. Michael Taylor, in 1857, reported an epidemic of milk-borne typhoid fever and, in 1867, an epidemic of milk-borne scarlet fever. MacNamara, in 1892, traced an outbreak of cholera at Calcutta to an infected dairy. Jacob, in 1877, reported an epidemic of milk-borne diphtheria at Sutton, England.

Mr. E. Hart, editor of the *British Medical Journal,* reported to the International Medical Congress at London, 1881, the following epidemics of milk-borne diseases: Typhoid fever, 50 outbreaks; scarlet fever, 15; diphtheria, 7; total number of persons involved in these several epidemics, 4,800. Hart, in the *British Medical Journal,* May, 1897, gave additional histories of instances of milk-borne disease, since his report of 1881. Epidemics of scarlet fever, 32; diphtheria, 15; typhoid fever, 48.

Kober at the International Medical Congress, at Paris, 1900, reported 330 outbreaks of milk-borne infections, namely: Ty-

phoid fever, 195; scarlet fever, 99; diphtheria, 36. These were from the following authorities: English, 243; American, 52; German, 14; Scandinavian, 11; French, 5; Austrian, 5. The English and the Americans use raw milk; on the continent milk is rarely used without being boiled.

When and why did our knowledge of milk-borne disease become demonstrable knowledge?

In the year 1882, when Koch made himself immortal by his demonstration of the existence of the tubercle bacillus, of its causative relation to consumption, of the possibility of its cultivation in a culture medium, and of its ability to cause consumption when administered in an efficient dose from such culture medium. Our demonstrated scientific knowledge of bacteriology contains at least three facts of enormous practical significance:

1. That many and possibly all of our transmissible diseases are caused by pathogenic microörganisms.

2. That these pathogenic microörganisms or many of them may be cultivated in various media, mixtures of water and albuminate matter closely resembling milkman's milk in distinct pathogenic virulence.

3. That many diseases can be caused by administering a suitable dose of the pathogenic organism of these diseases or of any of them from the infected culture medium.

What diseases are known to be transmitted by milk, by water, by milkman's milk? For our knowledge upon this important question we are as usual indebted to the art of medicine and also to the science of medicine. From these two sources we learn that the following diseases are transmitted by milk or by water or by the milk of the milkman, namely: Typhoid fever, cholera, dysentery, tuberculosis, diphtheria, anthrax, glanders and scarlet fever.

What diseases are possibly carried by and transmitted by the milk of the milkman? From the same sources as above mentioned we learn that the possibilities of milkman's milk includes in addition to the before-named diseases, the following: Pneumonia, cerebro-spinal fever, madura foot, measles, malaria, relapsing fever, gonorrhœa and syphilis.

What is our death rate from the diseases known to be transmitted by milkman's milk? The average annual death rate for the decade ending 1902, in the State of New York, for the diseases known to be transmitted by milkman's milk, was as follows: Typhoid fever, 1,635; scarlet fever, 1,020; consumption, 13,125; diphtheria, 4,085.

What is our death rate from the diseases which may possibly be transmitted by milkman's milk? In making answer to this question I shall try to speak from the mental attitude of the hygienist, who considers the work of the health officer the most important work that mortal man is ever called upon to perform, also that attaching to the position of the said health officer is the responsibility as solemn and as awful as was ever laid upon the shoulders of a human being. This duty and this responsibility requires of the health officer the constant exercise of all known and of all possibly known means for the prevention of disease. That his principle of official conduct must be that it is better to take many unnecessary precautions to prevent disease rather than to fail to take one possibly effective precaution.

With this explanation, let us look at the average annual death rates of the decade ending 1902, and let us put into the list all of the causes of death where there is a probability or even a possibility of impure or infected milk acting to produce morbidity or mortality. We will then note:

Deaths under five years of age	37,970
Cerebro-spinal meningitis	585
Malaria	360
Smallpox	155
Measles	925
Whooping cough	1,000
Diarrhœa	8,570
Acute respiratory diseases	17,500
Total deaths from diseases known to be transmitted by milkman's milk	19,845
Total number of deaths — the argument in favor of the importance and need of the milk register	85,930

The average annual deaths of the diseases named in the State of New York during the decade ending 1902.

Which of you have had epidemics of any of the above-named diseases within the jurisdiction where you are responsible for the prevention of the preventable diseases? Which of you can say that not one epidemic of milk-borne disease has existed in your jurisdiction since 1882?

When, and why, and how, are typhoid fever, scarlet fever and diphtheria transmitted by milkman's milk?

The family likeness of these epidemics is most striking. The infection comes from a failure to isolate the sick during the period of their illness in which the disease is communicable, and the slightly ill, the convalescents, the desquamating, those caring for the sick, milk the cows or care for the milk, as the milk is stored in rooms near to the sick; or water infected with the disease is used to clean the milk vessels, or to dilute the milk and the milk becomes infected, and the infection thrives and increases in the milk, and milk being a food intended for immediate use, carries with remarkable certainty the disease from its origin in the dairy to the consumer in the far-away city or town. Hart's work led to the passage of the dairies, cow sheds and milk shops' order of the English Local Government Board of 1885, possibly the pioneer milk ordinance.

Typhoid infection reaches milk by percolation through soil to a water supply, a well or a spring or a reservoir or a stream from cows feeding or wading in sewage-polluted pastures; from dairy hands having the disease, or acting as nurses to those so afflicted; from using the same cloths to bathe patients and to clean milk cans; from persons engaged in handling night soil, and from being stored under the same roof with one ill with the disease — in fact, when the disease exists at the farm or dairy.

Scarlet fever infection reaches milk when the disease is at the farm or the dairy; when those milking or handling milk visit a house having the disease; when milk bottles are taken from houses having the disease; when those having the disease care for the cows, milk the cows, or care for the milk, handle the milk or come near the milk; when the milk is stored near the room of one suffering from the disease; when the milk is aërated, as in the Briggs epidemic, under the roof of a house having one ill with the disease; when those who nurse the sick, milk the cows or handle the milk; when infected cloths or clothing come near the milk; when the cows suffer from streptococcic or staphylococcic infection.

Diphtheria infection reaches milk, when the disease is at the farm or the dairy; when those ill with the disease milk the cows or handle the milk; when the cows suffer from pyogenic infection, particularly of the udder or teats; or from foot and mouth disease.

Why should there be in the State of New York a milk register in every town where there is a milkman? Because of the uni-

formity of nature in physics, in chemistry, in biology, in physiology, in pathogenesis, in epidemiology. Because many of our most destructive diseases — the diseases which ravage our homes continuously and most distressingly — are known to be transmitted by the milk of the milkman. Because in almost every country of the civilized world epidemics of these diseases have been traced to infected milk. Because these same epidemics of milk-borne disease have ravaged the trusting and helpless people of our fair State, and this the milk register would demonstrate if it was in use. Because every principle of efficiency, every requirement of duty, every obligation of responsibility demands of those charged with guarding and protecting the public health that they be keen, and watchful, and quick, to discover epidemic disease; that they be in haste with preventive measures; that they run to the scene of every epidemic of milk-borne disease just as an efficient fire department turns out quickly and races in haste to the alarm of fire. Because that which the fire so fiercely and so ruthlessly destroys man did build, and man can rebuild again, but that which the fatal epidemic destroys is more valuable than palaces of granite and marble, human life, which once lost man is unable to replace.

What information upon the subject of milk-borne disease is overdue from the workers in our laboratories? What infections and toxins may develop in milk and what rôle do these play in pathogenesis? What are the possibilities of the infections or toxins of milk being found in cream, butter, buttermilk, curd, whey, cheese and sour milk? What relation have agitation, carriage or aviation of milk to its possibility of infection? What relation has the temperature of milk to the possibility of its infection?

How rapid is the rate of the propagation in milk of its various infections and toxins? What is the minimum toxic dose of the different milk-borne infections? How long do the various infections and the resulting toxins persist in pure milk, or in milkman's milk?

What is the resistance of the various infections and the resulting toxins of milk to lactic acid fermentation?

IV. BY EDUCATIONAL MEASURES

GEORGE W. GOLER, M.D.
Health Commissioner of Rochester

Early, very early in the morning, and again late in the afternoon, in thousands of barns in this and other States, thousands of milch cattle are milked every day in the year in order to supply the millions of people in New York State with milk. Of these millions of people 1,000,000 are children under five years of age. In round numbers, down in New York, nearly half a million. Here, in Buffalo, 50,000; in Rochester, 20,000; in Syracuse, 10,000 babies under five years of age, all dependent upon milk for food. A million babies; 9,000,000 people; some of them sick, must have this milk produced daily from the bodies of all these thousands of animals.

From these statements one would be led to think that the education and training of those intrusted with the production, transportation and distribution of milk would be made the subject of the State's greatest care. For are we not taught that the State depends upon the physical, mental and moral welfare of its children for the perpetuation of the Nation?

Do we see evidences of that care that milk demands by either the producer or the retailer? Does the producer handle his milk carefully, properly care for his utensils, store and transport it carefully, protect it at the railroad depots and provide for icing it on trains? Does the producer or the retailer clean his cans or utensils as they ought to be cleaned? Does he keep milk cold, or does he substitute pasteurizing or preservatives for ice? Is there even provision for determining what percentage of the milch cattle are subject to tuberculosis? What man may enter the business of milk production? Has he training? Does he enter the business of dealer in the most perishable of foods with that education and training which these million of infants have a right to demand for their protection, and which you, the State, should demand for them? They can neither speak nor vote as you men can vote or as both you men and you women can speak.

Inspection of milk and the protection which it should insure are both sadly lacking.

Is there a model farm where the dairyman may see and learn how he ought to produce and handle his product with financial

advantage to himself and sanitary advantage to you? Is there a model dairy where the retailers of milk may learn how best to handle milk and how best to clean and to keep clean milk and milk utensils? The men who work as barbers, the men who cut your corns or bunions, the men who bury your dead must all pass examinations before they can receive licenses to do these things, but the men who produce or who sell milk to the million of babies in the State of New York, are, as a class, without education or training in the simplest rules of cleanliness, and by a mere declaration and on payment at most of a dollar or two may purvey food to your children. With this food millions of organisms are frequently found in every teaspoonful. The germs of tuberculosis, typhoid and diphtheria and the poison of scarlet fever are but too often conveyed from the far away farm or the family of the retailer to the children of the State.

When will you, as a people, awaken to the necessity for clean milk? Not so much because milk may cause the death of many infants, but because of the danger of disease in the years of the child's formative state when the energies of the body should be used for growth, and not for resisting disease carried to it by milk.

In the countries of Europe the subject of milk as food for babies has received much attention within the last decade. Abroad, they have begun to realize that the character of the milk supplied to the babies is of importance because milk is almost the sole food of the baby. They have found, as in Berlin, for instance, where there were more breast-fed children than elsewhere, that in 1895, 45 per cent. of their infants were breast fed, but that in 1905 the number of breast-fed children had diminished to less than 33 per cent. We have in this country to-day, on the authority of special workers in children's diseases, less than 25 per cent. of mothers in affluent circumstances who are able to nurse their children. Other evidence could be adduced to show that the number of naturally suckled children is diminishing, and this being the case, we are compelled to fall back upon the cow, to make our babies parasites upon a four-footed board-faced animal who may furnish food for a calf, but only at the very best, indifferent food for a human baby.

Cows' milk, even chemically, is at best poor food for a human baby. It clots in larger and more indigestible lumps than woman's milk. It has a different fat, albumin and sugar content

than human milk. With all the skill of the most scientific treatment it is both chemically and physiologically unfit for a human baby. Artificial treatment, predigestion, gruel mixtures make it poor indeed in comparison with human milk. The only way to make cows' milk fit for a human baby is to feed it into the digestive tract of the human mother, in whose system it should be elaborated for her baby into human milk droplets from her breasts.

But we have before us the problem of 75 per cent. of our nurslings to be fed by the cow. You know the foul, dark, ill-ventilated, dirty stables, the dirty cows, cans and utensils, the flies, the swarms of bacteria in the artificial food of the baby. You know of the poor makeshifts, the strainers, the temptation to condense, cook and pasteurize and otherwise "ize" this food, and all the time those of us who are striving to teach the value of clean milk are learning the lesson of depopulated France, Germany and other European countries, viz.: that the most precious thing in the world is the human baby. We are learning this lesson, not yet perhaps as they have learned it, because in Europe the mothers bear children, and bearing children attempt to rear them, but here our native American women no longer bear children as they once did, and so as we import raw products of other kinds, we are now beginning to import most of our mothers.

But if we have not a large proportion of native-born children, let us try to keep those we have and all other children alive and well. Let us try to realize that the baby is a future citizen. Let us try to look upon the protection of the milk supply as one of the greatest measures of protection for these citizens. Milk is secondary in importance only to water. All people may and should join in protecting this great food supply. The physician especially may do much to advance this work if he will acquaint his patients with the necessity for procuring clean, cold milk, unchanged by any pasteurizing, or so-called concentrating process, and for protecting that milk by cleanliness and by icing, both before and after it reaches the consumer. The physician can assist in the establishment of milk stations throughout the city. Especially should such stations be established in connection with hospitals, particularly in those hospitals where clinics are held, so that the nurses in charge of the work, and the physicians and students attending the clinics may observe the value of clean

milk in the artificial feeding of infants. It is notorious that hospitals, as a rule, have the worst of milk supplies. It is supposed that their drugs are pure. Do they pay less attention to their milk than to their drugs? A patient becomes sick, the physician puts the patient upon a milk diet. How often does he know whence the milk comes, and whether it is clean or dirty? The importance of milk as food for older sick people is considerable, but of how much greater importance is it when the milk is to become food for infants? The results obtained from systematic milk inspection through the work of milk stations are remarkable, but still more remarkable are the results shown in the figures taken during the last three months in Rochester where all the deaths in infants under one year of age have been investigated with reference to whether the infants were breast fed or artificially fed, and if artificially fed, what was the standard of the milk obtained for their food?

During the months of July, August and September, the months of heaviest infantile mortality, there were 144 deaths in infants under one year of age. Of these (excluding four less than forty-eight hours old) 22 were breast fed, 122 bottle fed and of these 122 bottle-fed children who died during those three months not one of them received a really safe milk supply.

It may be fairly assumed that the breast-fed infants of the alleys have a far greater chance for life than their artificially fed brothers or sisters of the avenues. The children of those parents in affluent circumstances, when artificially fed, have a greater chance for life than the child so fed in the slums, or the carelessly fed child of a higher social grade. Artificially fed infants will thrive better on clean cows' milk in hot weather than on dirty milk in hot weather. They will even do better on home pasteurized or sterilized dirty milk than when fed on untreated dirty milk, but they will also do far better if artificially fed on clean, uncooked milk than on the best kind of commercially pasteurized or sterilized milk.

Figures for ten years show that infants do not die as frequently in cold weather on dirty milk as in hot weather. Else why do they not die in January as in July? The infant will stand dirty milk and cold, and it will endure heat alone, but it will not endure dirty milk and heat together. Clean, cold milk is the great necessity for the artificially fed baby. How many cities have clean milk, milk that can be trusted as a food for infants? Do

are we doing for our children? Are we cultivating them? Are we doing for them what the agriculturist does for grasses, fruits and flowers? Are we even in their formative state giving them decent food?

The subjects discussed before you to-night are part of a great social question. Upon the feeding and the training of our children we must depend for the stability and strength of the home and of the nation. The children of to-day are to be the parents of the future. To be strong, to be good parents they must be well fed. What are you going to do for the protection of their most necessary food? Will you leave it as it is, practically unprotected, or will you insist upon the enactment of laws for its protection, and the enforcement of the laws after they are enacted?

This is the larger view of the food of the child in its relation to the State, but as a narrower, though no less important relation of the living, robust child, to the parent, let me leave with you the thought that what you may do for your own child, you will help to do for all children; for as Guyau says: "It is in paternity alone, complete conscious paternity, that man first sounds the depths of his own heart."

(This paper was illustrated by lantern slides which added to its interest.)

V. BY THE USE OF THE SCORE CARD SYSTEM

BY ELLIS M. SANTEE, M.D.

Dairy Expert, U. S. Department of Agriculture, Washington

Publicity: The most effective weapon any health officer ever had in his warfare upon filth and disease (if judiciously used) is publicity; and the safest and most reliable medium for publication is the score card. A dairyman can always fight if you attempt to deprive him of his license — and he usually does — but when he drives up to house after house only to be told that his customers do not want any more of his milk because they have seen his sanitary score and found that his methods are bad, he usually gets very busy.

It is always best at first to publish only the higher scoring places. The poorer ones are easily picked out by their absence from the list, and most of them will mend their ways that they may appear in the next list.

It is well, also, to give notice at the time of the publication of the first list that at a certain time another score will be made and at this time all scores will be published. The slovenly dairyman cannot long withstand publicity.

The dairy score card for valuing, recording and publishing dairy conditions is being adopted by Boards of Health in cities of all sizes. It is proving invaluable to inspector, producer, vendor, consumer and Boards of Health alike.

As an Aid to Uniformity of Reports

In the past, too much reliance has had to be placed upon the personal view point of the inspector. Send three men to report upon a place according to the old methods, and one will report it good, another poor, and the other may call it bad, depending entirely upon what each is looking for.

In one city whose work has come under my personal observation, a number of dairy farmers have been driven out of business because one of its inspectors has an exalted idea of a condition too often found in the spring of the year—a great amount of manure collected in the barn yards. Now this condition counts for only 3 per cent. in the U. S. Department of Agriculture score card. A man who had gone to much expense to fit up a fine place that scored 76 after he had given up trying to produce a good

quality of milk, was refused a license and financially ruined for this reason. Neighbors who happened to have good yards but scored only from 30 to 45 were allowed to continue. An intelligent application of the score card would have corrected each of these abuses, some of which bear heavily upon the individual producer, while others are unjust to the consumer.

As an Aid to Inspectors

A score card tells the inspector what to look for, records in concise and permanent manner what he sees and learns, proves a valuable insurance against successful questioning by producers of the justice of his conclusions, and removes sources of difference between them. Thus the efficiency of the work is at least doubled.

As an Aid to the Producer

The score card shows him the requirements, the good and bad points of his establishment, acts as a medium of perfect understanding between himself and the inspector, and furnishes the best producer a means of getting a just reward for his efforts to produce a good article. There was little incentive to the intensely practical farmer to produce a meritorious product while his neighbor was receiving the same price for a very inferior one. In one city where the price was fairly uniform, one of the best scoring dairy farms which has been getting from 12 cents to 18 cents per gallon for its milk, very soon, after the fact became known that it scored 90 points, entered into a yearly contract at 22 to 24 cents per gallon. Numerous incidents of like results might be cited.

As an Aid to the Dealer

The score card enables the vendor intelligently to select sources of supply, thereby helping the good producer who should be encouraged. The dealer can keep tab on the sources of his supply during the time of the contract, and likewise be furnished with a valid reason for any objection that he may raise in a contention with the producer.

As an Aid to the Consumer

A score card enables the consumer to comprehend the conditions surrounding the sources of his own supply without visiting the place, which is seldom done.

As an Aid to the Boards of Health

Boards of Health adopting the use of the score cards can not only keep posted as to dairies, but also as to the work of the

inspector. The card is a guarantee against partiality on the part of the inspector. The report is written and a mistake stares him in the face forever.

As a Stimulant to the Spirit of Emulation

The inevitable result of the use of the score card is the premium in price to the producer furnishing the best milk. In places where the system has been followed for any length of time the score of the average dairy increases each year, and the use of the card has been satisfactory to all concerned.

Methods Generally Adopted

After tactfully acquainting the producer with the object of his visit, and getting matters upon a mutually agreeable footing, the inspector looks over the herd with special reference to the general condition, cleanliness, and outward evidences of disease. The ones most often found are udder troubles, labored breathing, and those disturbances indicated by dullness of eyes. The stables are examined with reference to location, cleanliness, purity of air, the presence of other animals, and general arrangement for comfort and health of the cows, such as floor, bedding, light, ventilation, amount of air-space, food and water. Dust-catching ledges are scored as defects.

The milk room is inspected with reference to location, equipment, cleanliness, light, ventilation, freedom from flies, and construction of floors, ceilings and sidewalks.

The utensils are scored with reference to construction, cleanliness and care after cleaning. To get a correct estimate of the method of cleaning utensils, milking and cooling the milk without being present when the work is being done, will many times require the skill of a trial lawyer. It is usually better to ask for the description of methods than by direct questions.

After the score is completed, if each point is explained to the producer much misunderstanding may be avoided. If possible he should be made to feel satisfied with his score. The success or failure of any inspector may always be gauged by the frame of mind in which he leaves the producer, and while he should have the power to temporarily suspend a license he should seldom use it. When police work is needed a letter from the office usually bring the offender in, and a heart-to-heart talk with the Chief Inspector or the Health Officer usually has the desired effect.

UNITED STATES DEPARTMENT OF AGRICULTURE,
BUREAU OF ANIMAL INDUSTRY,
DAIRY DIVISION.

SANITARY INSPECTION OF DAIRIES.

DAIRY SCORE CARD.

Owner or lessee of farm:.....
Town:..... State:.....
Total No. of cows:..... No. milking:..... Quarts of milk produced daily:...
Product is sold at wholesale—retail. Name and address of dealer to whom shipped:
.....
Permit No .....Date of inspection:..... 190

	Score.		Remarks.
	Perfect.	Allowed.	
Cows			
Condition	2	.....	.....
Health: Outward appearance	3	.....	.....
Comfort	2	.....	.....
Ventilation	4	.....	.....
Cubic space	3	.....	.....
Cleanliness	5	.....	.....
Food	2	.....	.....
Water	4	.....	.....
Total	25	.....	Per cent perfect
Stables.			
Location	3	.....	.....
Construction	5	.....	.....
Cleanliness	7	.....	.....
Light	5	.....	.....
Stable air	2	.....	.....
Removal of manure	2	.....	.....
Stable yard	1	.....	.....
Total	25	.....	Per cent perfect
Milk House and Storage.			
Location	2	.....	.....
Construction	2	.....	.....
Equipment	3	.....	.....
Cleanliness	3	.....	.....
Care and cleanliness of utensils	5	.....	.....
Water supply for cleaning	5	.....	.....
Storing at low temperature	5	.....	.....
Total	25	.....	Per cent perfect
Milking and Handling Milk.			
Cleanliness of milking	10	.....	.....
Prompt and efficient cooling	10	.....	.....
Protection during transportation	5	.....	.....
Total	25	.....	Per cent perfect
Total	100	.....	

QUESTION 1. Has the herd passed the tuberculin test within a year? Yes. No
QUESTION 2. Has the water supply been examined for contamination? Yes. No.
QUESTION 3. Is there any case of contagious disease on the farm that is not properly isolated? Yes. No.

Signed.....
Inspector.

NOTE.—If conditions are so exceptionally bad in any particular as to be inadequately expressed by a score of 0 the inspector will write BAD in the column of Remarks, opposite the 0.

DIRECTIONS FOR SCORING

(Check each allowance or deduction made where amount of score is not self explanatory.)

COWS

NDITION.—Allow 2 if in good flesh. Deduct according to conditions.
EALTH.—Allow 3 if apparently healthy. Deduct for indications of disease.
OMFORT.—Allow 2 for good conditions. Deduct 1 for poor or no bedding and 1 if left too long in cold outside or inside of stable.
NTILATION.—Allow 4 for good system — King or muslin curtain; 2 for windows inclining inward at top; 1 for sliding windows; and nothing for holes in ceiling.
UBIC SPACE PER COW.—Allow 3 if 500 to 1,000 cubic feet per cow; 2 for less than 500 and over 400; 1 for less than 400 and over 300; for less than 300, 0. Deduct 1 for each 500 cubic feet over 1,000 under winter conditions.
LEANLINESS.—Allow 5 if perfect. Deduct 1 if flanks and udders are not kept clipped, otherwise according to conditions.
FOOD.—Allow 2 if good. Deduct for anything musty or decomposed.
WATER.—Allow 4 for clean running water in trough NEAR stable and 3 for same INSIDE stable; deduct for running water DISTANT from stable according to distance; deduct 1 for still water or water pumped by hand. (Water from windmill tanks under good conditions will be considered as running water.)

STABLES

LOCATION.—Allow 3 if used for no other purpose, conveniently located, on well-drained ground, with yard protected from cold winds. Deduct 3 if horses, swine, or poultry are kept in stable. Deduct 1 if poultry are allowed in stable during day.
CONSTRUCTION.—Allow 1½ for floor of good cement or equally good material in good condition; good wood floor 1; properly constructed gutter ½; good stall, swinging stanchion, or good tie ½; smooth tight ceiling ½; ceiling proper height ½; side walls smooth and tight ½; convenient box stall ½; good low-down manger ½.
CLEANLINESS.—Allow 4 for a washed floor; 2 if well swept; and 1 if well scraped. Allow 1 for clean side walls; 1 for clean windows; and 1 for clean ceilings and ledges.
LIGHT.—Allow 5 for four square feet of unobstructed glass per stanchion or stall and evenly distributed. Deduct ½ point for each square foot less than four; deduct 2 for uneven distribution of light, not exceeding 2 points.
CLEAN AIR.—Allow 2 if free from dust and odors at time of milking. Deduct according to conditions.
REMOVAL OF MANURE.—Allow 2 if removed daily to field or to proper pit giving off no odors to stable. Deduct 1 if removed to yard and over 30 feet from stable; otherwise allow 0.

MILK HOUSE AND STORAGE

CLEAN YARD.—Allow ½ point if clean, and ½ point if well drained.
LOCATION.—Allow 2 if conveniently located, away from hog pen, privy, or other source of contamination. Deduct 1 for no clear air space between stable and milk room.
CONSTRUCTION.—Allow 2 for tight, sound floor, walls, and ceiling, well lighted, well ventilated, and free from flies.
EQUIPMENT.—Allow 1 point for hot water or steam for cleansing utensils; ½ point for cooler in good condition; 1 for proper narrow-top milk pail; ½ point for general utensils properly constructed.
CLEANLINESS.—Allow 3 if interior is clean. Deduct according to conditions.
UTENSILS.—Allow 3 if clean; 2 for proper care (inverted in pure air). Otherwise, 0.

WATER SUPPLY FOR CLEANING.—Allow 5 if abundant, convenient, and pure. Deduct according to conditions.

STORAGE.—Allow 5 if stored at 50° F. or below; over 50° and not over 55° F., 4; over 55° and not over 60° F., 3; over 60° F., 0.

MILKING AND HANDLING MILK

CLEANLINESS OF MILKING.—Allow 3 for clean suits used only for milking and kept in a clean place when not in use. Allow 4 for washing udders and teats and wiping them with a clean towel; 2 if wiped with moist cloth only; 1 if wiped with clean, dry cloth; 0 if cleaning is done after milker sits down to milk or if no attention is given. Allow 2 if milking is done with clean, dry hands.

PROMPT AND EFFICIENT COOLING.—Allow 5 if cooled immediately after each cow is milked. Allow 5 if cooled to 50° F. or below; over 50° and not over 55° F. 4; over 55° and not over 60° F., 3; over 60° F., 0.

PROTECTION DURING TRANSPORTATION.—Allow 5 if iced and covered; 4 if cans are jacketed or covered with clean, wet blanket; 2 for dry blanket. If no protection, 0.

(This paper was followed by a talk by Dr. Santee, in connection with a number of lantern slides, which he showed. This talk was interesting and instructing, but would not be intelligible without the slides and, therefore, is not published.)

Dr. LE SEUR — I now think that our thanks are due to those who were most responsible for this grand Conference; thanks to Mayor Adam for his kind welcome and to Health Commissioner Wende for his appreciation and assistance, therefore, let it be

Resolved, That the health officers of the Empire State hereby express their hearty appreciation of the efforts of the Commissioner of Health of the State of New York, Dr. Eugene H. Porter, to make this Convention the largest, most interesting, instructive and useful ever held.

Resolved, That we do hereby unanimously pledge our united and enthusiastic support to the Health Department of the Empire State and to its efficient head, Dr. Eugene H. Porter.

Resolved, That the hearty thanks of the members of this Sanitary Conference are hereby tendered to his Honor, Mayor Adam and Colonel Ward, Commissioner of Public Works, to the President and Secretary of the Chamber of Commerce, to Dr. Ernest Wende, the efficient Health Commissioner of Buffalo and his staff, to Mr. Almy, Secretary of the Charity Organization Society, to the members of the medical profession in Buffalo, to Dr. Eckel and his corps of demonstrators of the Tuberculosis Exhibition, to Dr. Benjamin Wende of the Meat Inspection Department, to the gentlemen and institutions whose valuable loans added so much to the extent of the Tuberculosis Exhibition, and to all those whose masterly papers have furnished so much food for thought and valuable information during the Conference.

And Resolved, That our hearty thanks are also tendered to the newspapers of Buffalo, which have reported so faithfully and extensively the proceedings of this Conference.

All in favor say "aye."

(The vote of thanks was unanimously adopted.)

Commissioner PORTER — I have nothing else to say to this most successful Conference of health officers in the history of the State other than to remind you of next year, that we expect all of you to be with us. And now — Good luck, good fortune, and good health.

The Seventh Annual Conference of the Sanitary Officers of the State of New York adjourned *sine die* at 11 p. m.

HEALTH OFFICERS IN ATTENDANCE AT CONFERENCE

ALBANY COUNTY

I. S. Becker, Altamont.
W. O. Congdon, Clarksville.
J. R. Davidson, Bethlehem.
F. H. Hurst, Guilderland Center.
Albert Mott, Cohoes.
M. S. Reid, Coeymans.

ALLEGANY COUNTY

A. T. Bacon, Canaseraga.
C. R. Bowen, Almond.
J. W. Coller, Wellsville.
H. E. Cooley, Angelica.
Wm. Dillon, Wellsville.
G. W. Hackett, Ceres.
N. J. Hardy, Belmont.
C. F. Hoffman, Bolivar.
F. E. Howard, Friendship.
H. L. Hulett, Allentown.
O. N. Latham, Bolivar.
W. H. Loughhead, Andover.
S. B. McClure, Allegany.
V. A. Mann, Canaseraga.
Grant Norton, Belmont.
C. W. O'Donnell, Andover.
Mark Sheppard, Alfred.
T. S. Thomas, Cuba.
F. H. Van Orsdale, Belmont.
J. R. Waterman, Centerville.
Clarence Wheaton, Canaseraga.
G. H. Witter, Wellsville.

BROOME COUNTY

Chas. S. Butler, Harpursville.
E. N. Christopher, Union.
J. D. Guy, Chenango Forks.
I. A. Hix, Binghamton.
H. C. Peck, Port Dickinson.
A. H. Pellette, Whitney's Point.
Z. A. Spendley, Chenango Forks.
E. L. Teed, Lisle.

CATTARAUGUS COUNTY

J. P. Boothe, Olean.
J. C. Clark, Olean.
E. L. Fish, Ashford.
S. Z. Fisher, Randolph.
Dr. Will Gardner, Conewango.
Dr. James E. Holden, Otto.
Dr. W. B. Johnston, Ellicottville.
Dr. W. W. Jones, Dayton.
Dr. Chas. Kelly, Franklinville.
Dr. Clarence King, Machias.
Dr. F. Krehbiel, Delevan.
Dr. A. D. Lake, Perrysburg.
Dr. T. B. Loughlen, Olean.
Dr. Robert Mason, Little Valley.
Dr. R. F. Rowley, Portville.
Dr. E. M. Shaffner, Great Valley.
Dr. T. E. Spalding, Salamanca.

CAYUGA COUNTY

Dr. A. H. Brown, Auburn.
Dr. N. B. Ford, Owasco.
Dr. Frank Hoxie, Union Springs.
Dr. Frank Kenyon, Scipio.
Dr. Chas. L. Lang, Cato.
Dr. H. Strohmenger, Kelloggsville.
Dr. J. H. Witbeck, Aurelius.

CHAUTAUQUA COUNTY

Dr. L. C. Baldwin, Fredonia.
Dr. A. J. Bennett, Lakewood.
Dr. Chas. S. Cleland, Charlotte.
Dr. G. E. Ellis, Dunkirk.
Dr. Wm. Follett, Sandusky.
Dr. Scott D. Gleeten, Silver Creek.
Dr. Guy Granger, Sherman.
Dr. J. J. Lenhart, Bemus Point.
Dr. D. S. Macnee, Ripley.
Dr. John J. Mahoney, Jamestown.
Dr. F. G. Osborne, Ellington.
Dr. W. J. Prish, Fredonia.
Dr. Wm. A. Putnam, Forestville.
Dr. Edgar Rood, Westfield.
Dr. O. C. Shaw, Cassadaga.
Dr. A. F. Soch, Fredonia.
Dr. C. W. Southworth, Forestville.
Dr. Walter Stuart, Westfield.

CHENANGO COUNTY

Dr. L. C. Andrews, Pitcher.
Dr. W. Lee Dodge, Afton.

Dr. H. C. Lyman, Sherburne.
Dr. Jas. B. Noyes, New Berlin.

CLINTON COUNTY.

Dr. Gilbert D. Dare, Cadyville.
Dr. J. H. La Rocque, Plattsburgh.
Dr. J. B. Ransom, Dannemora.
Dr. W. U. Taylor, Mooers.

COLUMBIA COUNTY

Dr. Z. F. Dunning, Philmont.
Dr. P. R. Flanagan, West Lebanon.
Dr. Jas. W. King, Stottville.
Dr. Chas. E. O'Neil, New Lebanon.
Dr. Rensselaer Platner, Germantown.
Dr. Louis Van Hoesen, Hudson.

CORTLAND COUNTY

Dr. Geo. D. Bradford, Homer.
Dr. E. A. Didama, Cortland.
Dr. Henry Field, Marathon.
Dr. M. L. Halbert, Cincinnatus.
Dr. John E. Leonard, Harford Mills.
Dr. Bert R. Parsons, Marathon.
Dr. J. W. Whitney, Homer.

DELAWARE COUNTY

Dr. C. S. Allaben, Margaretville.
Dr. O. T. Bundy, Deposit.
Dr. S. Peter Cornell, Sidney Center.
Dr. H. J. Goodrich, Delhi.
Dr. Edward A. Holmes, Downsville.
Dr. H. P. Hubbell, Stamford.
Dr. H. W. Keator, Griffins Corners.
Dr. G. T. Scott, Davenport.

DUTCHESS COUNTY

Dr. H. S. Bontecou, Matteawan.
Dr. R. H. Breed, Wappinger Falls.
Dr. R. J. Carroll, Red Hook.
Dr. J. M. Cronk, Hyde Park.
Dr. J. H. Dingman, Tivoli.
Dr. C. L. Fletcher, Dover Plains.
Dr. E. J. La Mooers Mills.
Dr. Geo. Huntington, Hopewell Jct.
Dr. I. D. LeRoy, Pleasant Valley.
Dr. J. E. Moith, Fishkill-on-Hudson.
Dr. C. S. Van Etten, Rhinebeck.

ERIE COUNTY

Dr. H. L. Atwood, Collins.
Dr. E. H. Ballou, Gardenville.
Dr. F. W. Bentley, N. Tonawanda.
Dr. Abraham Berry, Clarence Center.
Dr. C. E. Bowman, Alden.
Dr. A. R. Bradbury, Grand Island.
Dr. Mark N. Brooks, Springville.
Dr. E. W. Buffum, East Aurora.
Dr. E. W. Ewell, Lancaster.
Dr. Francis E. Fronczak, Buffalo.
Dr. Wm. A. Gerber, East Aurora.
Dr. F. A. Helwig, Akron.
Dr. Geo. N. Jack, Depew.
Dr. H. W. Johnson, Gowanda.
Dr. F. H. Johnston, Farnham.
Dr. W. B. Jolls, Orchard Park.
Dr. E. W. Jones, Hamburg.
Dr. H. C. Lapp, Clarence.
Dr. G. W. McPherson, Lancaster.
Dr. John G. Miller Lancaster.
Dr. H. A. Pierce, Blasdell.
Dr. Morris Pitcher, Sardinia.
Dr. M. B. Shaw, Eden.
Dr. B. E. Smith, Angola.
Dr. F. H. Stanbro, Springville.
Dr. H. P. Trull, Williamsville.
Dr. W. M. Ward, North Collins.
Dr. Ernest Wende, Buffalo.
Dr. J. D. Wooster, Wales.

ESSEX COUNTY.

Dr. G. H. Beers, Ticonderoga.
Dr. Albert H. Garvin, Raybrook.
Dr. F. M. Noble, St. Armand.
Dr. F. E. Sweatt, Essex.
Dr. C. B. Warner, Port Henry.
Dr. T. A. Wasson, Elizabethtown.

FRANKLIN COUNTY

Dr. D. E. Moody, Dickinson Center.
Dr. F. M. Noble, Bloomingdale.
Dr. Chas. C. Trembley, Saranac Lake.
Dr. Chas. F. Wicker, Saranac Lake.
Dr. S. D. Williamson, Malone.

FULTON COUNTY

Dr. John Edwards, Gloversville.
Dr. H. C. Finch, Broadalbin.
Dr. G. B. Ingalls, Mayfield.
Dr. John F. Kean, Gloversville.
Dr. D. E. Lake, Fulton.

GENESEE COUNTY

Dr. Robert M. Andrews, Bergen.
Dr. J. W. Baker, Batavia.

Dr. W. O. Burbank, Pavilion.
Dr. Henry E. Gainard, Stafford.
Dr. E. E. Hummel, Darien Center.
Dr. A. P. Jackson, Oakfield.
Dr. John W. LeSeur, Batavia.
Dr. W. A. Macpherson, LeRoy.
Dr. M. P. Messinger, Oakfield.
Dr. J. B. Miller, Alexander.
Dr. A. Prince, Byron.
Dr. S. W. Skinner, LeRoy.
Dr. E. C. Smith, Corfu.
Dr. W. E. Whitcombe, Batavia.

GREENE COUNTY

Dr. George Conkling, Durham.
Dr. George Haner, Tannersville.
Dr. Stanley Vincent, Catskill.
Dr. Chas. E. Willard, Catskill.

HAMILTON COUNTY

Dr. Thomas McGann, Wells.
Dr. Fred Stevenson, Indian Lake.

HERKIMER COUNTY

Dr. Chas. H. Glidden, Little Falls.
Dr. Cyrus Kay, Herkimer.
Dr. Adam Miller, Jordanville.

JEFFERSON COUNTY

Dr. W. W. Carleton, Waterloo.
Dr. J. D. Cole, Alexandria Bay.
Dr. E. M. Crabb, Cape Vincent.
Dr. J. T. Fowkes, La Fargeville.
Dr. L. E. Gardner, Black River.
Dr. C. J. Hull, West Carthage.
Dr. J. E. Jones, Evans Mills.
Dr. A. L. Morgan, Dexter.
Dr. D. C. Rodenhurst, Philadelphia.

LEWIS COUNTY

Dr. Geo. H. Littlefield, Glenfield.
Dr. F. M. Rongrose, Constableville.
Dr. J. W. Short, Redfield.
Dr. I. D. Spencer, Croghan.
Dr. P. H. Von Zierolshofen, Croghan.

LIVINGSTON COUNTY

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